



FY2017

# US Forest Service Aviation Safety Summary



USDA Forest Service FY2017 Aviation Safety  
Summary  
Forest Service  
FY2017

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## SCOPE OF THIS REPORT

This Aviation Summary provides statistical information for aviation activities under the operational control of the US Forest Service (FS) and for Forest Service Owned and Operated (O/O) or “Fleet” aircraft during Fiscal Year 2017. The report also makes comparisons to historical data. It includes information from SAFECOM reports, flight hour tracking, accident/incident analysis and reviews. Due to the volume and variations in aviation management policies and processes among agencies, states and cooperators, the taxonomy of the data is relevant only to Forest Service (FS) aviation management. Using this specific taxonomy provides for data integrity and allows FS aviation safety personnel to best gauge how well the agency Safety Management System (SMS) is working within the parameters they have direct influence over.

## EXECUTIVE SUMMARY

The Forest Service incorporates Safety Management System principles as a core business practice to accomplish aviation safety goals. SMS is the international industry standard for aviation safety and provides the structure within a network of programs that includes aviation safety policy, promotion, assurance and risk management. Mishap prevention is influenced by the quality of information available that may affect our decisions, actions, behaviors and attitudes towards the work we do.

### FISCAL YEAR (FY) 2017 AVIATION SAFETY SUMMARY

FLIGHT HOURS	85,126
# SAFECOM REPORTS	474
# ACCIDENTS	1
# INCIDENTS	3
# FATALITIES	0

The Interagency SAFECOM reporting system satisfies Federal Aviation Regulation requirements for incident reporting, but more importantly, it provides management and front line supervisors with information about aviation concerns, issues or hazards as they occur. Although the primary purpose of the SAFECOM system is for timely reporting of safety concerns, data from the reports can be monitored and trended to detect issues that could potentially affect safety. Reporting allows aviation users and managers to take appropriate actions as a defense helping to prevent mishaps from occurring.

**Note:** the symbol “#” seen throughout this report refers to **number**, (not a hashtag).

## THE FOREST SERVICE AVIATION PROGRAM

Approximately 300 employees at the Washington Office, Regional Offices and Forest levels administer the Forest Service aviation program. The national staff is located in Washington D.C. and at the National Interagency Fire Center in Boise, Idaho. The vast majority of aviation personnel are located throughout the forests, where local forest and regional staff provide day-to-day operational oversight and program guidance within their respective regions/units.



The Forest Service utilized approximately 615 aircraft in FY 2017. These include government-owned and leased, but primarily contracted aircraft. Numerous state agencies and county municipalities operate aircraft that have been acquired for use under the Federal Excess Personal Property (FEPP) program. Under the FEPP program, the Forest Service holds the registration and transfers the aircraft to authorized programs (bailed agreements). These aircraft are not included in statistics or mishap data as operational control typically resides with the operator (state or county municipality), unless the aircraft is operating on a FS controlled incident or mission.

- Missions: The primary mission of Forest Service Aviation is to support natural resource programs including, but not limited to:
  - Aerial delivery of firefighters by parachute, rappel rope, or on site landing
  - Air tactical command and control
  - Surveillance, reconnaissance, and intelligence gathering
  - Infrared detection & mapping
  - Aerial delivery of fire retardant and water
  - Passenger transport for firefighting and resource missions
  - Administrative flights
  - Research
  - Forest rehabilitation
  - Forest Health Protection (aerial surveys, application and photography)
  - Law enforcement
  - Aerial photography
  - Emergency Medical Assistance

## SAFETY MANAGEMENT SYSTEM (SMS)



Safety Management Systems influences the organizational culture. SMS practices involve engaging people to make safety a shared responsibility and recognizing the value of teamwork across aviation disciplines (operations, safety, airworthiness, training, etc.). Organizing aviation operations with an SMS mindset allows the agency to maintain control over the key factors that affect safety performance. This structure provides an effective and proven way to organize and apply what we know so that we continue to learn and make necessary adjustments in a tangible, measurable way.

A Safety Management System provides the organizational framework to construct and support a sound safety culture that actively controls risk exposure. The goal is to develop a safety culture that achieves and maintains a zero accident rate. In order to accomplish this, we need to maintain the capability to continuously seek out and eliminate latent defects within our systems and culture.

**The four pillars of SMS that comprise the Agency's safety management system are briefly described below:**

**Policy** formalizes the agency's fundamental approach to achieve acceptable or tolerable safety. It identifies management commitment, responsibility and accountability for the program and the appointment of key safety personnel.

**Risk Management** is the core of the SMS. It is the avenue to recognize and address hazardous conditions at a point where they can still be effectively managed. It involves identifying the hazards, assessing the risk, analyzing the risk, and controlling/mitigating the risk. This is a fundamental activity that relies on reporting of hazards by people who coexist with or encounter them.

**Assurance** activities are designed to monitor our aviation activities and provide us with adequate confidence that our system achieves an acceptable or tolerable level of safety. Assurance activities and controls include quality assurance audits and reviews, pre-use inspections, review and analysis of historical data, accident/incident investigation, error analysis, and corrective action plans.

**Promotion** includes processes and procedures that ensure our personnel are trained, informed and competent to perform duties in the safest manner possible. This includes communication of safety issues in the form of alerts, bulletins, and lessons learned that provide a sense of purpose to safety efforts. Promoting safety in the agency helps to build and sustain a culture that goes beyond merely avoiding accidents or reducing the number of incidents, it sets the stage for aviation personnel to do the right thing at the right time in response to both normal and emergency situations.

## AVIATION SAFETY DATA AND STATISTICS - FY2017 & 10 YEAR

Tracking aviation activities is critical in establishing confidence in the agency's performance as SMS implementation continues to evolve. Tracking, reporting and sharing safety information feeds the safety culture and provides a means to compare safety efforts with outcomes.

Data capturing of aviation information (audits/reviews, SAFECOM system, investigations, etc.) involves collecting both *leading and lagging indicators* of safety performance. Capturing both types of data helps us identify and understand potential weaknesses in our safety efforts so we can adjust and predict future success. **Leading indicators** are focused on future safety performance and continuous improvement. These measures are proactive in nature and report on efforts completed on a regular basis to help identify safety issues and correct them to help prevent mishaps. Examples include: quality assurance program audits, aviation safety training, implementation of accident recommendations and base reviews. **Lagging indicators** are the traditional safety metrics that display accident and fatality numbers and rates. The reactionary nature of lagging indicators makes them an imprecise indicator of safety. In short, lagging indicators measure undesirable outcomes; leading indicators are data collected that can be utilized to prevent undesirable outcomes.

## LEADING INDICATORS - ACCOMPLISHMENTS IN AVIATION SAFETY – FY2017

### POLICY:

- ➔ Re-write of Forest Service Manual (FSM) 5700 complete
- ➔ Provided technical expertise to several Interagency guides and handbooks updates
- ➔ Provided aviation safety input for the updated HC-130H Operations Plan
- ➔ Participated in the development of the Sherpa Operations Plan

### RISK MANAGEMENT:

- ➔ Instructed multiple risk management sessions nationally (A-205; 305)
- ➔ Provided Safety Officer oversight to the HC-130H Airtanker program
- ➔ Ensured inclusion of SMS requirements into Type 3 Helicopter, Next Generation Airtanker, and Light Fixed-Wing Contracts
- ➔ Assembled Aviation Investigation Review (AIR) with Agency SMEs (2-HOS, HMGB-PLDO, RXB1-FMO—see acronyms defined on page 28) to evaluate the Desoto Helicopter Accident recommendations and develop an agency action plan

### ASSURANCE:

- ➔ Coordinated investigations for 3 Incidents With Potential (IWP), Incidents and other Lessons Learned Reviews.
- ➔ Participated in contract technical evaluation board proposals
- ➔ Participated in various quality assurance reviews, including Region 5 Night Helicopter Ops QA and Region 5 Pilot Safety Audits at 3 different locations (Redding, Lancaster, McClellan)

### SAFETY PROMOTION:

- ➔ Published Annual Aviation Safety Report
- ➔ Published Annual Aviation Safety Briefing and presented at Helicopter Association International (HAI), several Regional Aviation and Safety meetings, Helicopter Crewmember, Helicopter Manager and Helibase Manager Courses
- ➔ Provided administration and review to all USFS and State SAFECOMs and management of WO, Vendor and some State SAFECOMs
- ➔ Published a combined total of 23 Safety Alerts, Technical Bulletins, Lessons Learned, Accident Prevention Bulletins and Information Bulletins
- ➔ Presented A-200 Aviation Mishap Reviews at HAI, several Regional Aviation and Safety meetings, Helicopter Crewmember, Helicopter Manager and Helibase Manager Courses
- ➔ Delivered Crew Resource Management (CRM) 7 Skills Training:
  - Initial CRM- 16 classes with 336 FS & Inter-Agency students completing
  - Refresher CRM- 8 classes with 128 FS & Inter-Agency students completing
  - Train the Trainer- 2 classes with 36 FS & Inter-Agency students completing



- ➔ Evaluated 10 USFS CRM 7 Skills Facilitators
  - Total number of CRM Facilitators is now 81 (58 USFS, 17 BLM, 1 NPS, 5 State)
- ➔ Delivered 3 SMS presentations
- ➔ Delivered Human Factors and A-200 at the interagency Aviation Centered Education (ACE)
- ➔ Supported nine employees in earning their Career Certificate in Aviation Safety Management Systems and the Federal Aviation Safety Officer Certificate.
- ➔ Twenty-five employees applied for and received scholarship funding to take courses in Aviation Safety Management Systems from institutes of higher education.
- ➔ USFS students completed a total of 11,655 Interagency Aviation Training (IAT) modules. These were completed through Classroom (2,930 modules), Webinars (249 modules) and on-line learning (8,476 modules)

## SAFECOM STATISTICAL SUMMARY

The SAFECOM statistical summary is comprised of both narrative and graphic displays that present the Forest Service SAFECOM data submitted to the Interagency SAFECOM database. In fiscal year (FY) 2017 there were 474 Forest Service SAFECOMs submitted; the 10-year average of SAFECOMs submitted annually is 486.

USFS Fleet (O&O) aircraft are not separated in the SAFECOM data system and are reported under the actual type of aircraft; fixed-wing, airtanker or helicopter.

The SAFECOM report is not a substitute for taking immediate needed action. The first step to dealing with a safety issue is to try to correct the situation at the lowest level possible and follow-up with a SAFECOM to document. If the safety issue requires subject matter expertise to resolve, contact the Regional Aviation Safety Manager (RASM) to facilitate collaboration with Regional subject matter experts; for example: Aviation Maintenance Inspectors (AMI), Helicopter Operations Specialist (HOS), and Helicopter Inspector Pilots (HIPs).

**Note:** *The SAFECOM system is not a venue to launch complaints or to seek punitive action. Although used to provide statistics, the SAFECOM system is primarily a communication tool to report hazards and safety issues allowing appropriate action to be taken in a timely manner. SAFECOM reports can alert aviation managers to emerging safety trends allowing them to be reversed. SAFECOM reports are also used to identify good decisions and positive safety events that can generate Airwards.*

## MARGIN OF ERROR - SAFECOM REPORTING

The information pulled from the SAFECOM system is highly contingent on a positive safety reporting culture. The data displayed is considered a representative sample, rather than a complete capture, of issues encountered in the field. To continue to build trust in the system and improve the reporting culture, it is imperative that use of the SAFECOM system is promoted appropriately by aviation supervisors and that SAFECOMs are never used punitively or sent to the public side un-sanitized.



## SUMMARY – TOTAL NUMBER OF SAFECOM REPORTS – ALL CATEGORIES

The overall total of SAFECOMs reported in FY17 for all agencies is 937 (474 Forest Service, 373 DOI, 88 State and 2 Other/Unknown/Military/Vendor).

The 10 most reported USFS SAFECOMs in FY2017 were:

1. Incident - \*Precautionary Landing (72),
2. Mishap Prevention – Kudos (46),
3. Airspace – Intrusion (41),
4. Maintenance - Engine (34),
5. Hazard other (32),
6. Maintenance – Other (29)
7. Airspace- UAS (25),
8. Hazard – Mission Equipment (25),
9. Maintenance – Chip Light (25),
10. Management – Internal (23),

*\*Precautionary landing*—a premeditated landing, on or off an airport, when further flight is possible but inadvisable. These are aeronautical decisions that can prevent a situation from progressing into an emergency. (Reference: [The Airplane Flying Handbook](#) (FAA, 2016)). Examples include: landings due to deteriorating weather, chip light, or fuel management/low fuel.

Other notables: Airspace – Procedures (22), Communication – (22), Policy Deviation - (20)

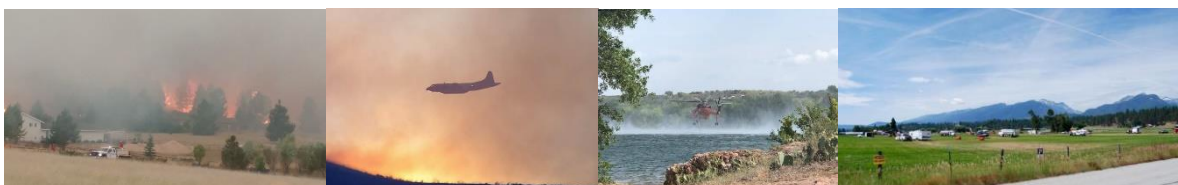
### 10-Year SAFECOM Data

Year	Number of SAFECOM's
2017	474
10-Year Total	4860
10-Year Average	486



### 2017 FS SAFECOMs by Aircraft Type

Aircraft Type	Number
Fixed Wing	96
Helicopter	239
Helitanker	23
Airtanker	47
N/A	8
Other	2
SEAT	10
UAS	21
USFS Owned/Operated	28
Total	474

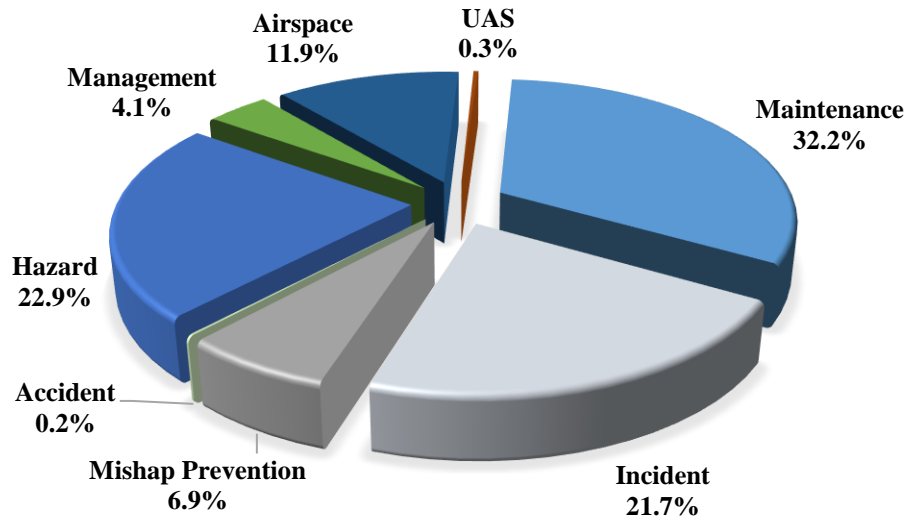


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## PERCENT SAFECOMS BY CATEGORY – FY2017

The numbers of SAFECOMs by category will exceed the total number of SAFECOMs reported as each SAFECOM may have more than one category assigned to it. For example several Incident and Hazard SAFECOMs may also have a Maintenance component.

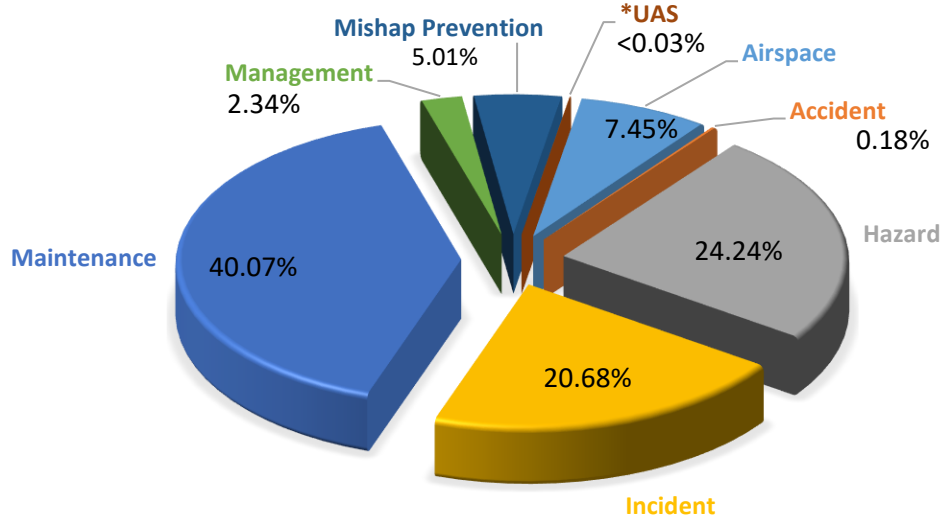
### SAFECOM - PERCENTAGES PER CATEGORY - 2017



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## PERCENT OF SAFECOMS BY CATEGORY – 10 YR: FY08-FY17

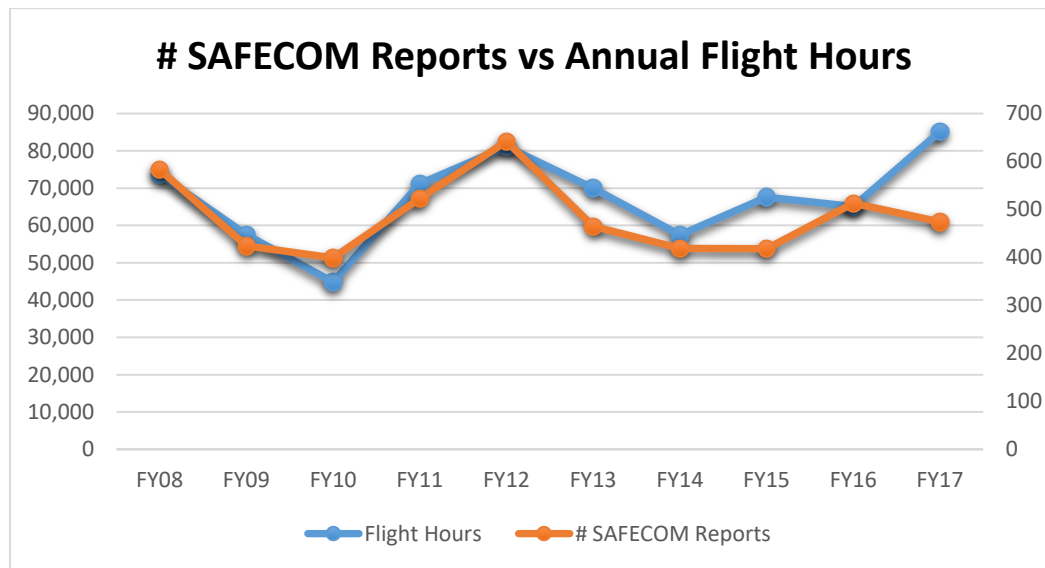
### 10 YR - % SAFECOMS BY CATEGORY



\*UAS (Unmanned Aerial Systems) is a new category in the SAFECOM system

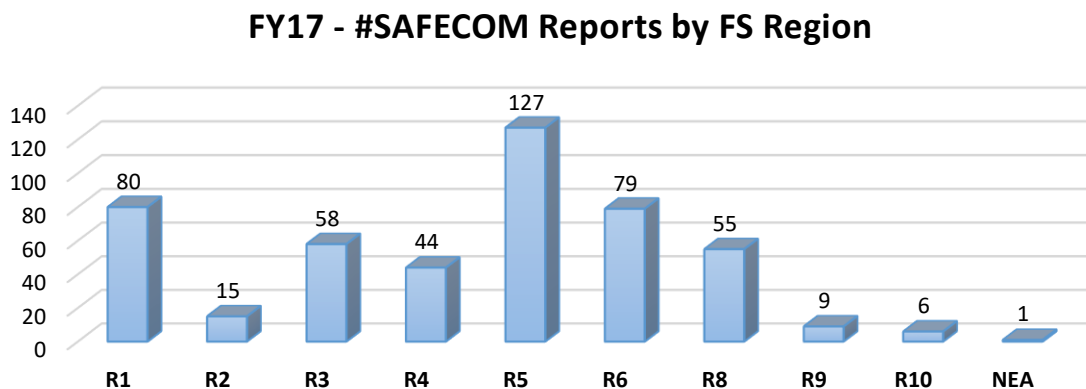
## SAFECOMS REPORTED VS FLIGHT HOURS – FY08-FY17

There is a general positive correlation between the flight hours (an indicator of operational tempo) and the number of reports (reporting culture) over the past 10 years, until 2017, when the number of reports drops (downward) from the flight hours. Interpreting this is only speculative. Because flight hours and the number of SAFECOM reports appear to correlate, this information will continue to be reviewed and trended. The decline in the number of reports in 2017 could be as simple as less safety issues or concerns to report, or it could be an early indicator of a drop off in reporting.



## #SAFECOMS BY FS REGION – FY2017

The amount of reporting in each Forest Service Region generally correlates with the amount of flight hours and complexity of missions flown. Regional Aviation Safety Managers (RASMs) follow up on each SAFECOM received in their respective Region by evaluating and processing the reports and providing lessons learned when appropriate.



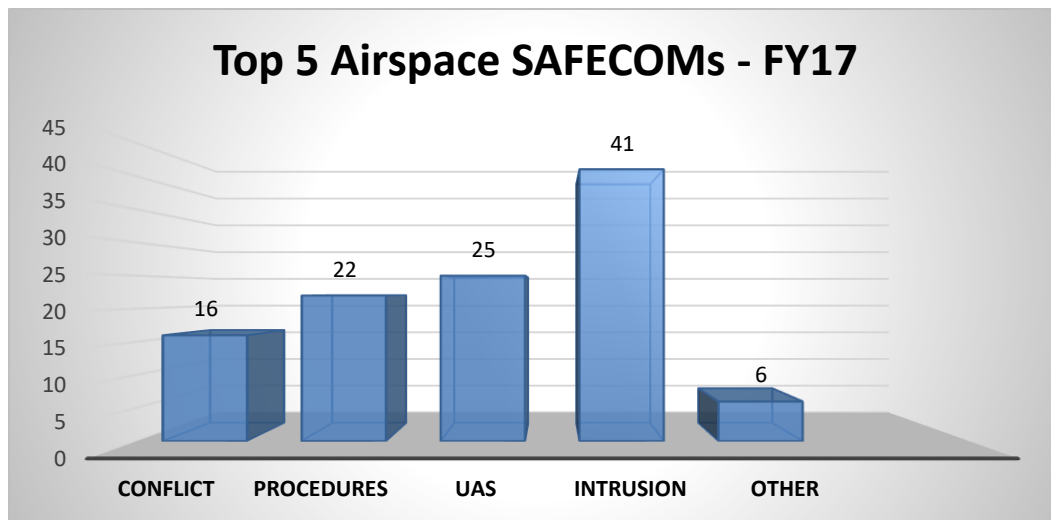
## SAFECOM STATS BY CATEGORY

### ACCIDENT

The FS experienced one (1) Aircraft Accident in FY17. This aircraft was a Forest Service Cessna TU206G (fleet) that sustained damage to the firewall and nose wheel after a porpoised landing in gusty conditions. There were no injuries.

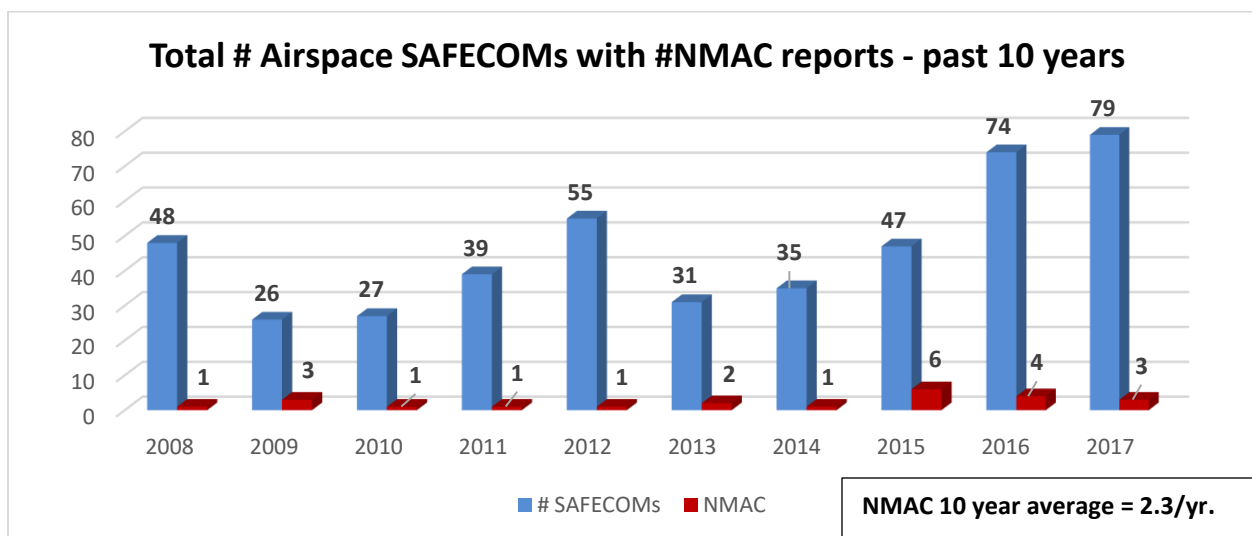
### AIRSPACE

There were a total of 79 Airspace SAFECOMs reported in 2017; the 10 year average is 46. There were three near mid-air events; the 10-year average is 2.3. There were 41 *intrusions* in which 11 of those reports involved UAVs (Unmanned Aerial Vehicles), as compared to 2016 when there were only 5 UAV airspace intrusions reported. Out of 16 Airspace *conflict* SAFECOMs, 7 involved UAVs. These were also subcategorized as Airspace: UAS. UAS was added as a subcategory to the SAFECOM system in 2017 to better track intrusions and conflicts involving recreational UAVs. (**Note:** UAV refers to the vehicle itself and UAS is an all-encompassing term describing the entire operating system for the UAV: the ground control station with operator, communications equipment, support equipment etc.).

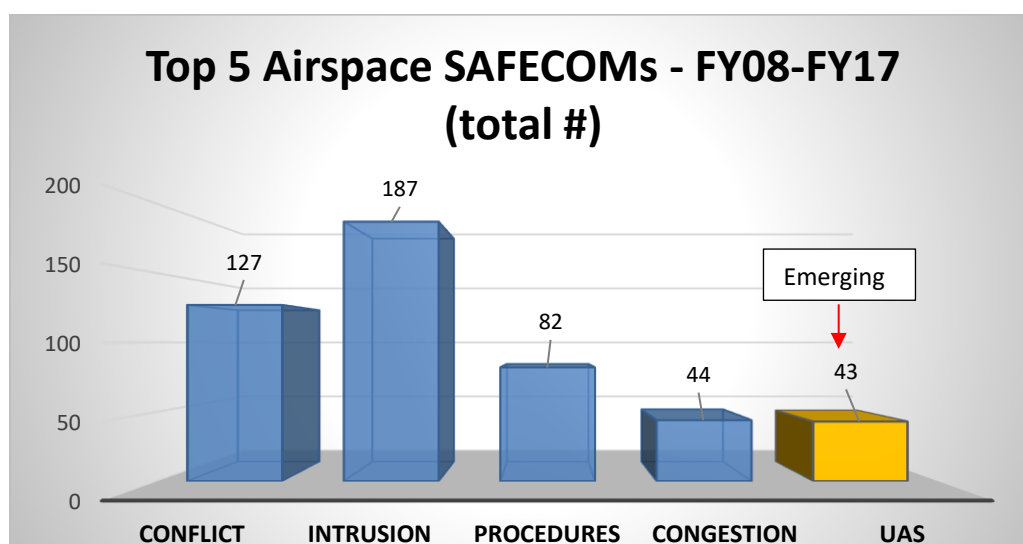


\* In all reports where UAVs were encountered in the Airspace, aviation operations were shut down until deemed safe to return.



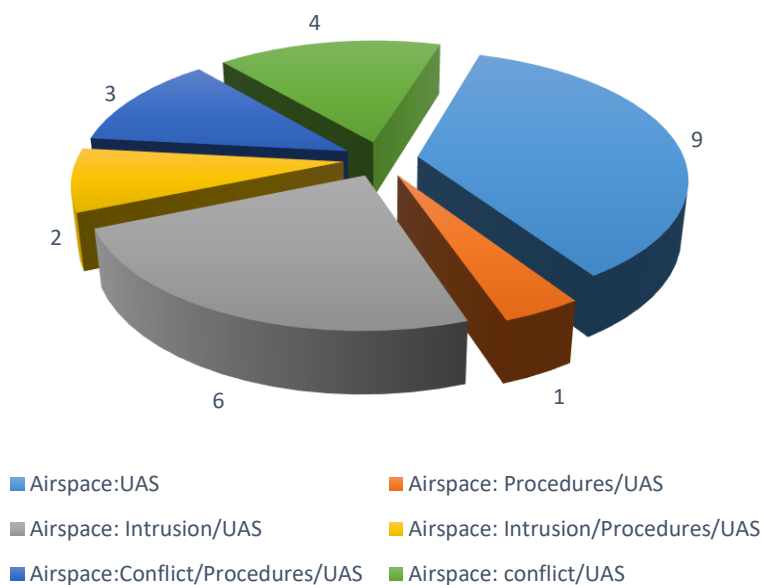


The FS continues to monitor the number of near mid-air collision (NMAC) reports. NMAC is a constant hazard, with an average of about 2.3 reported per FY (23 reports from FY08-FY17). A near mid-air collision is defined by the Federal Aviation Administration (FAA) as “an incident associated with the operation of an aircraft in which a possibility of a collision occurs as a result of proximity of less than 500 feet to another aircraft and/or where a report is received from a pilot or other flight crew member stating that a collision hazard existed between two or more aircraft.” Incident aviation operations are often conducted under adverse flight conditions that can include congested airspace, reduced visibility, poor weather/turbulence and mountainous terrain. These conditions add risk and complexity to the missions and can create environments that contribute to near mid-air events.



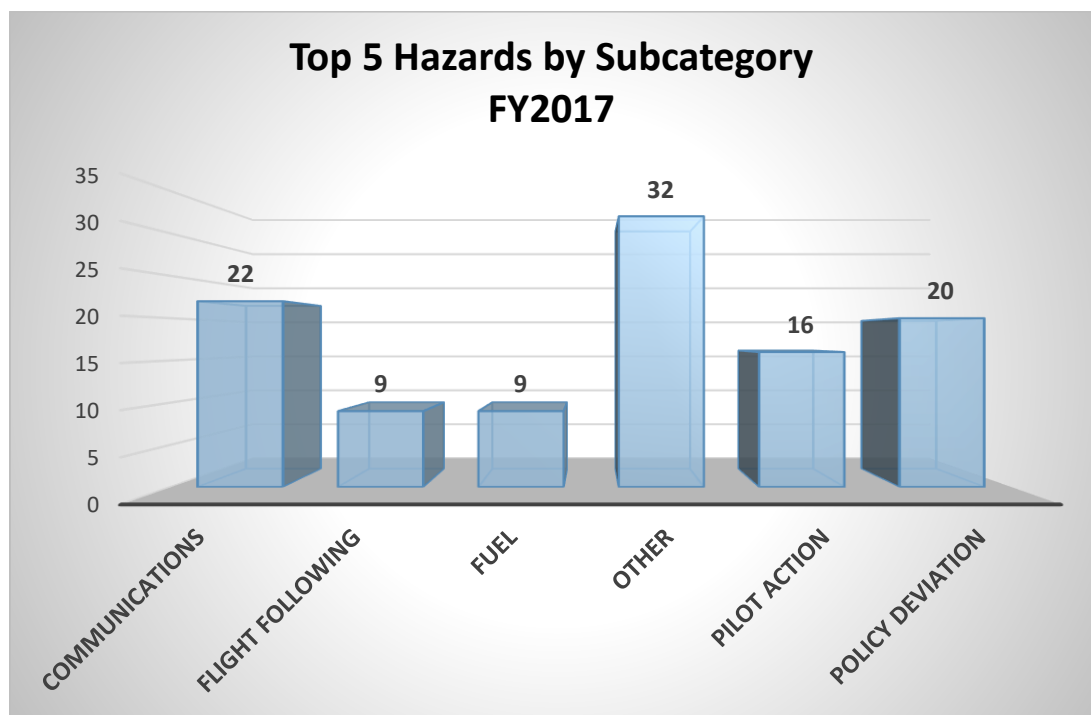
UAS Airspace issues are an emerging concern, as verified by the number of SAFECOM reports shown in the graph above (43). UAS intrusions and conflicts have made it into the top 5 with only 2 years’ worth of reporting under this new subcategory (18 reports in 2016, 25 in 2017)—the other 5 categories shown consist of a full 10 years of data.

## FY17 Airspace: UAS reports

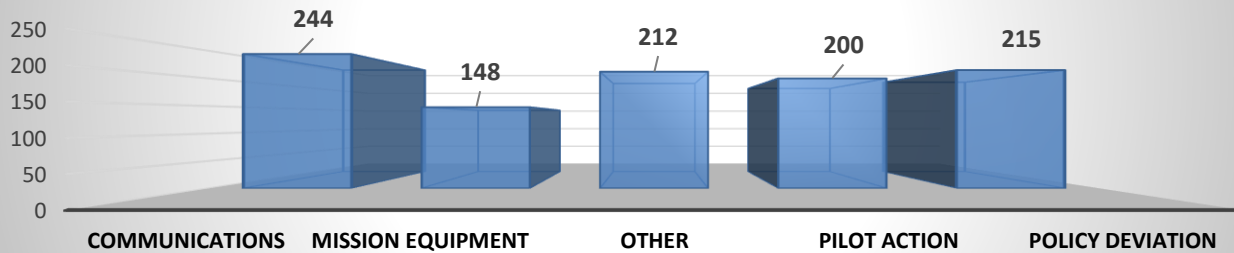


## HAZARDS

There were a total of 152 Hazard SAFECOMs reported. The following 2 graphs display 1) the top 5 Hazard SAFECOMs reported and 2) the number of Hazard SAFECOMs for the past 10 years.



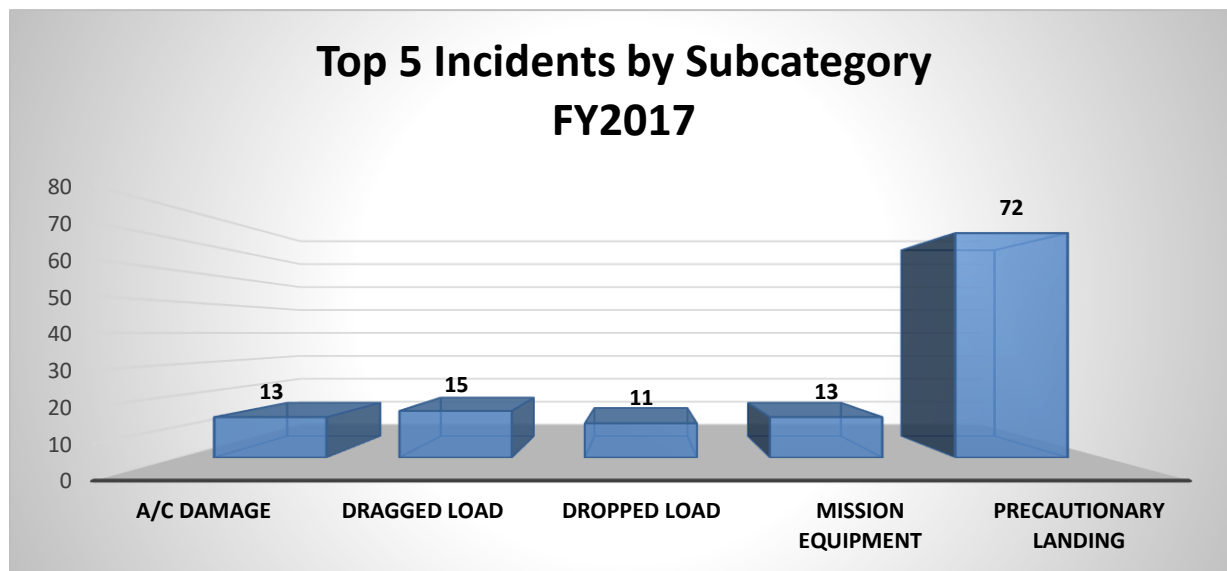
### Top 5 HAZARDS by Subcategory FY08- FY17 (total #)



## INCIDENTS

There were a total of 146 Incident SAFECOMs reported in FY17. The graphs in this section display the top 5 Incident SAFECOMs reported (listed by subcategory) and the total number of Incident SAFECOMs (by subcategory) reported for the last 10-years. The Forest Service experienced 3 events considered to be Incidents With Potential in FY17: 1 was a near mid-air collision (NMAC) in the landing pattern of an airport between a large airtanker and a SEAT (location of an Airtanker Base); 1 was a near CFIT (controlled flight into terrain) after an airtanker experienced significant down air after a retardant drop and had to take steps to avoid terrain, and 1 was a hydraulic failure resulting in a nose gear collapse on the landing rollout. Additionally, there were 2 NMAC SAFECOMs incorrectly reported in the SAFECOM system under Forest Service operational control (Brianhead Incident). These two reports fell under the operational control of the State of UT, and therefore are not included in the statistics.

### Top 5 Incidents by Subcategory FY2017

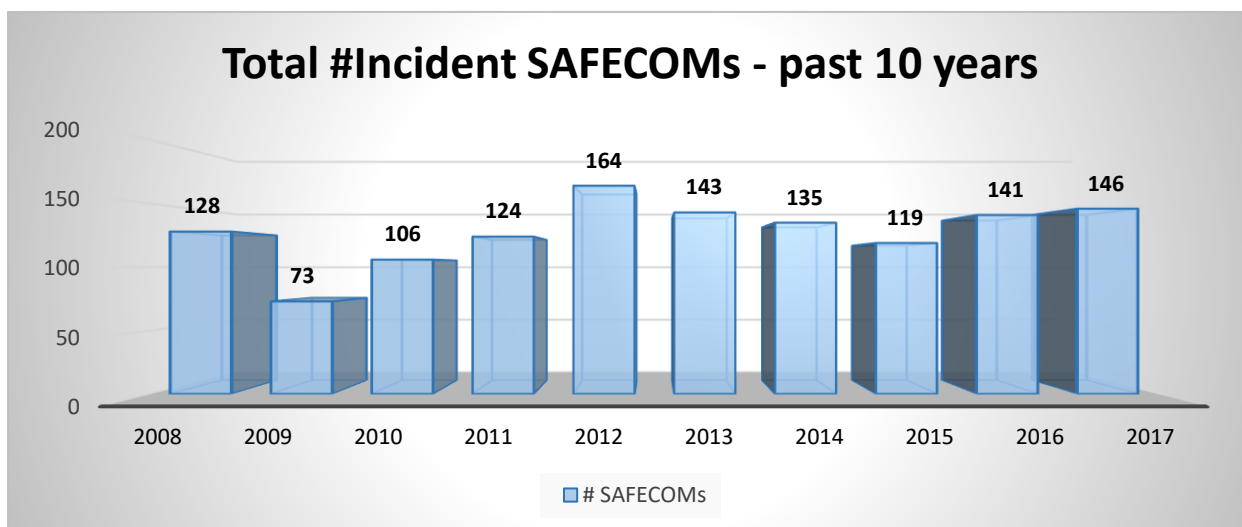
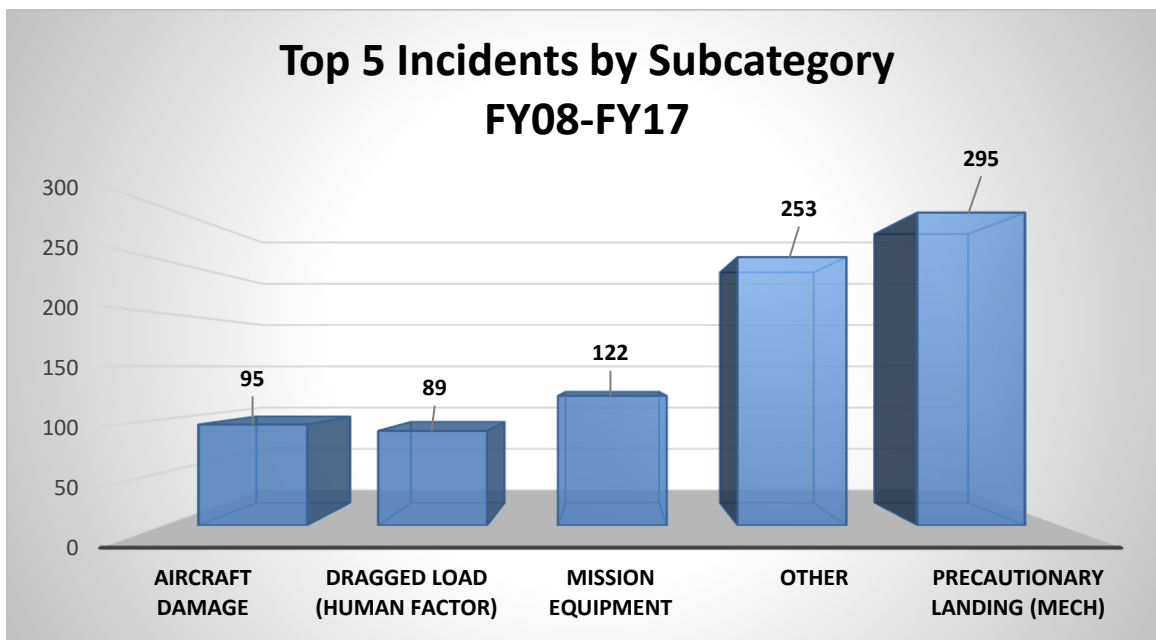


\*Precautionary Landing includes the general category, crew, mechanical and weather

\*Dragged Load includes the general category, human and mechanical

\*Dropped Load includes the general category, human and mechanical



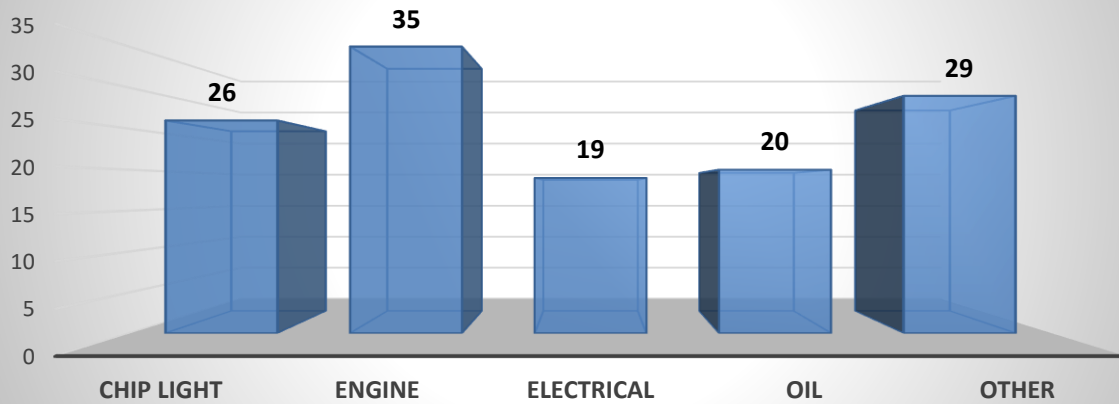


## MAINTENANCE

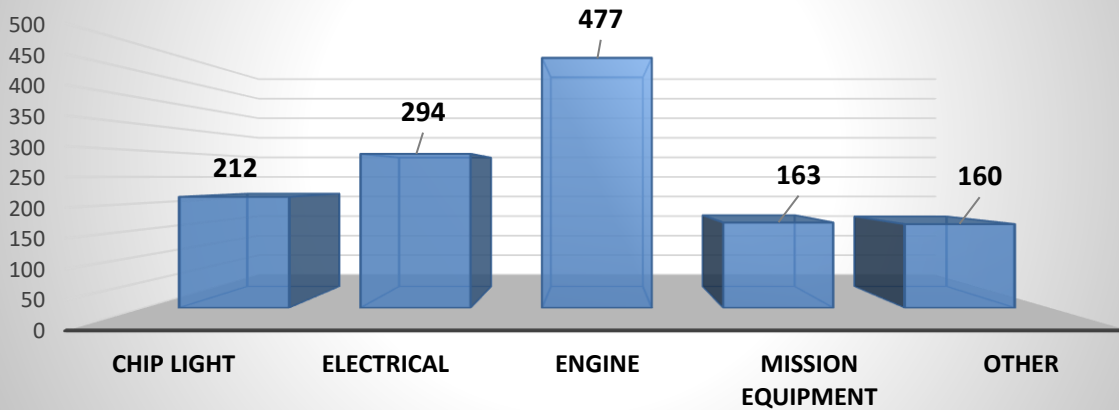
There were a total of 216 maintenance related SAFECOMs reported in FY17, which includes several subcategories. Below are the top 5 Maintenance SAFECOMs reported by subcategory and the total number of maintenance SAFECOMs reported for the past 10 years. Maintenance related SAFECOMs accounted for 32% of all the FY17 USFS SAFECOM reports. Engine maintenance discrepancies continue to be the most reported; there were a total of 35. Eight (8) of the 35 were either an engine failure or required an engine shutdown.



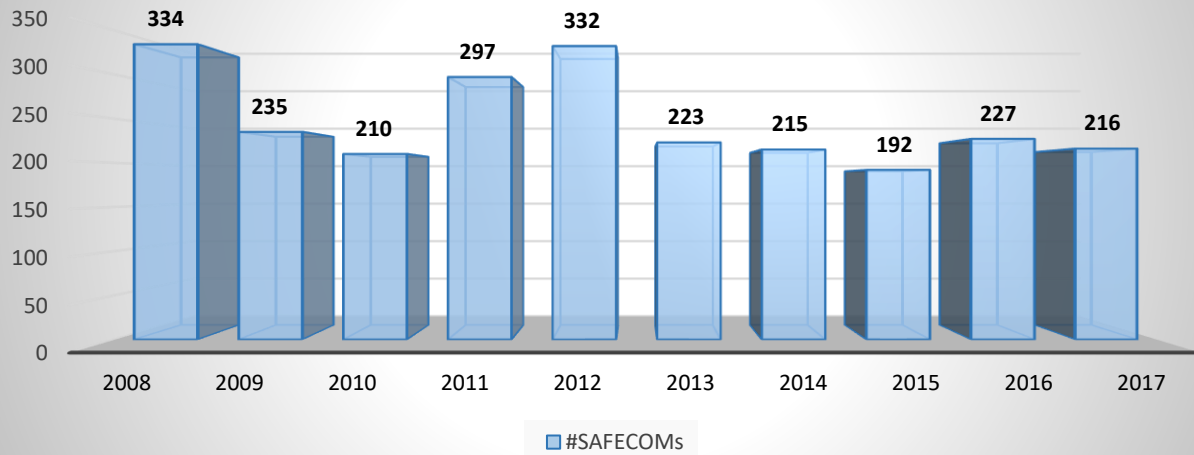
**Top 5 Maintenance Reports by Subcategory - FY2017**



**Top 5 Maintenance Reports by Subcategory  
FY08-FY17**



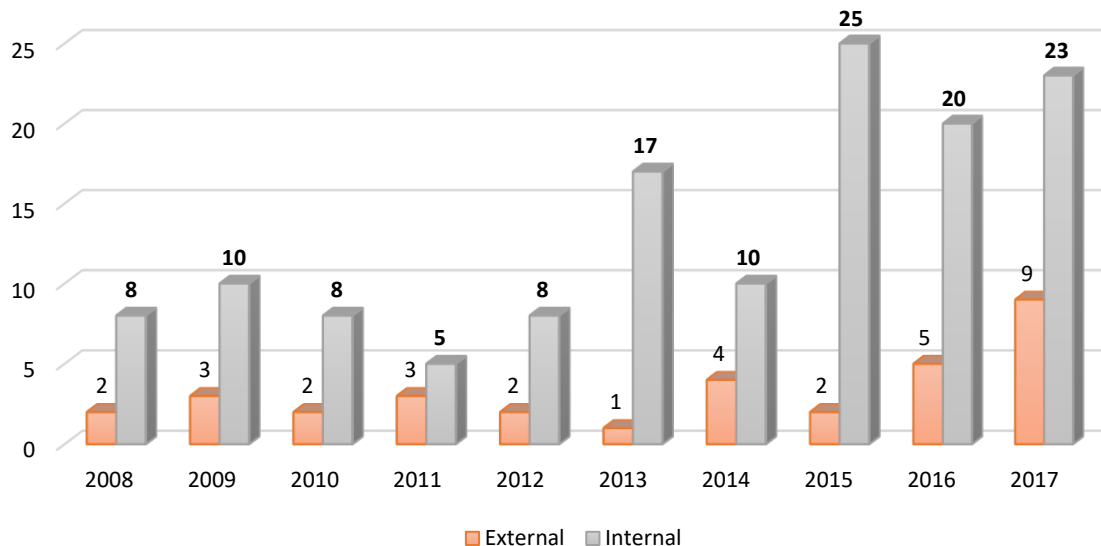
## Total #- Maintenance SAFECOMs - FY08-FY17



## MANAGEMENT

There were a total of 27 management related SAFECOMs reported, which includes both internal (23) and external (9) subcategories. Some Management SAFECOM reports are categorized as both internal and external, which results in the subcategory number exceeding the total number of Management reports. Below are the SAFECOM reports classified as Management, sub-categorized by internal and external.

## Total # Management SAFECOMs by subcategory FY08-FY17

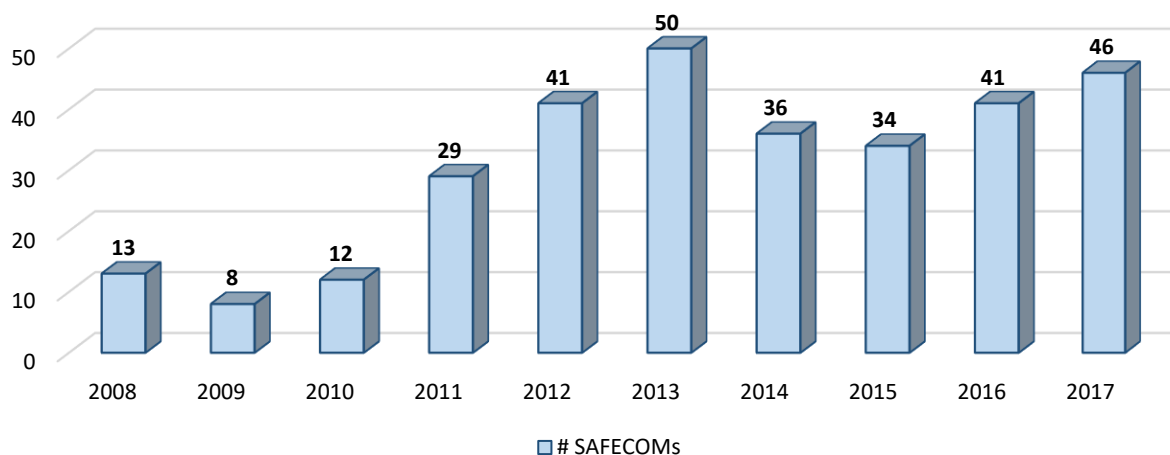


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## MISHAP PREVENTION

There were a total of 46 Mishap Prevention SAFECOMs in FY17. This category recognizes the positive actions of aviation personnel that contribute to safe attitudes, behaviors and outcomes. Most Airwards come from the SAFECOM system under this category.

**Total # Mishap Prevention SAFECOMs  
FY08-FY17**

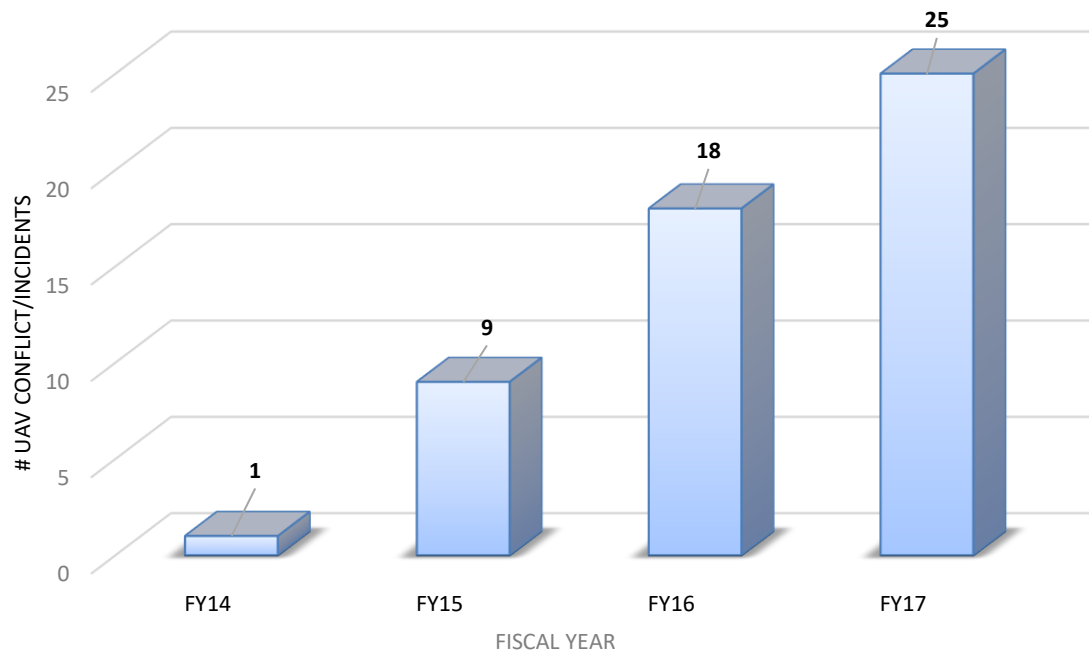


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## Unmanned Aerial Systems (UAS)

UAS was added as a main category in the SAFECOM system in 2017 to help capture safety events for the growing use of UAS by both federal agencies, cooperators and the public. There were only 2 reports in the UAS main category in FY17; both related to fleet operations. In 2016, UAS was also added as a subcategory under Airspace (see Airspace section, previously described). The first report of a UAV safety concern related to FS operations occurred on the Pfeiffer incident in December of 2013 (FY14), when a local news station launched a UAV from Big Sur Station. A Forest Service Public Information Officer witnessed the launch and convinced the news station to discontinue the flight due to potential conflicts with fire-fighting aircraft. This occurrence was reported in the SAFECOM system as an Airspace-Conflict. The graph below displays the number of SAFECOM reports related to UAS operations (prior to 2016, UAV airspace intrusions were captured as airspace conflicts or intrusions). Due to the sharp rise in UAV conflicts experienced with fire-fighting aircraft, The National Multi-Agency Coordinating Group released formal correspondence in June 30, 2017 relating to Unmanned Aircraft System (UAS) incursions on fires. Protocol for notifications and actions is located on the Fire Unmanned Systems Subcommittee resources page at the follow <https://www.nwcg.gov/sites/default/files/memos/eb-m-16-006a.pdf>.

## #UAV Airspace conflicts/intrusions on record

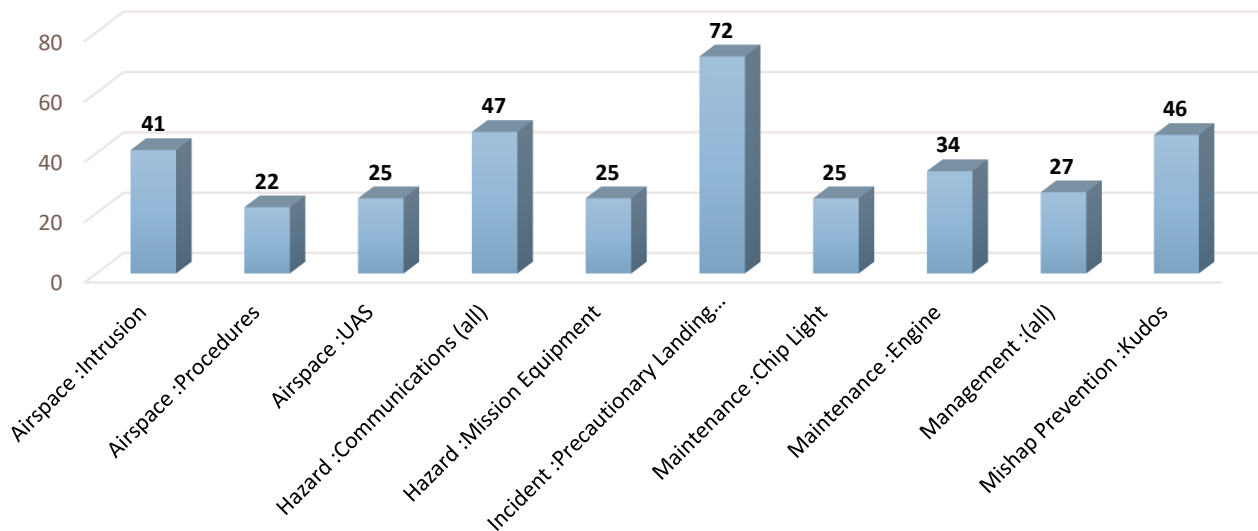


As we experience increasing numbers of unmanned aerial vehicles (UAVs) on fires within Fire Traffic Areas (FTAs), within Temporary Flight Restrictions (TFRs) or on initial attack fires, there is an increase in potential for a collision between a FS mission aircraft and UAVs. This threat requires our constant vigilance and when we experience these intrusions, it requires our immediate action. Unauthorized UAV presence over fires compromises the safety of firefighters and all aircraft on the incident.



## TOP 10 SAFECOM REPORTS BY CATEGORY/SUBCATEGORY– FY2017

### FY 2017 - 10 most reported SAFECOMs by category/subcategory



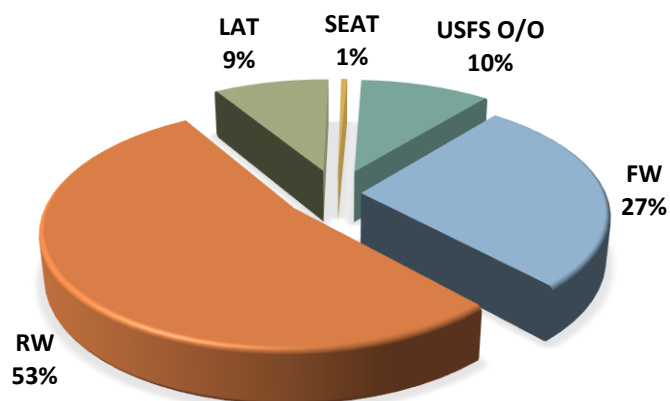
## FLIGHT HOURS STATS

### 10 – YEAR FLIGHT HOUR STATS

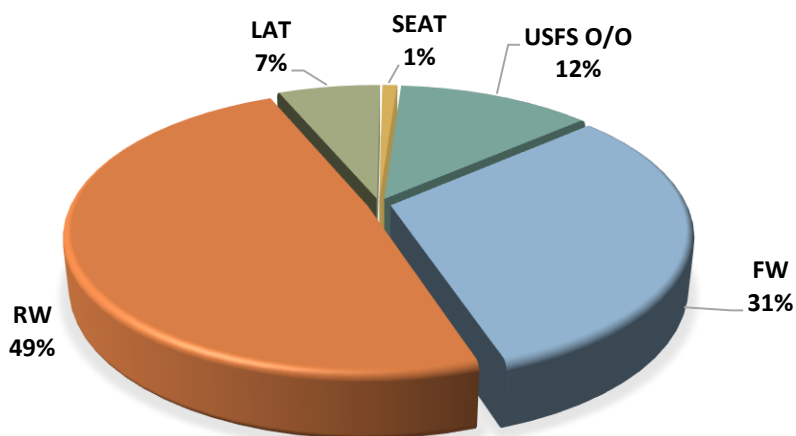
10-Year Flight Hour Statistics						
Fiscal Year	Fixed Wing	Helicopter	LGAT	SEAT	USFS Fleet (O&O)	Total
<b>2017</b>	<b>23,217</b>	<b>45,285</b>	<b>7,625</b>	<b>393</b>	<b>8,606</b>	<b>85,126</b>
<b>2016</b>	18,238	32,594	5,997	558	7,684	65,071
<b>2015</b>	21,709	32,253	4,710	484	8,424	67,580
<b>2014</b>	17,910	27,769	3,405	505	7,894	57,483
<b>2013</b>	22,972	34,860	2,966	534	8,672	70,004
<b>2012</b>	26,299	40,904	3,382	821	9,728	81,134
<b>2011</b>	22,846	34,106	4,550	578	9,126	71,206
<b>2010</b>	15,227	18,707	2,853	379	7,667	44,833
<b>2009</b>	18,576	26,439	3,684	781	8,056	57,536
<b>2008</b>	23,600	35,512	5,010	1,318	8,187	73,627
<b>10-year Totals</b>	<b>210,594</b>	<b>328,429</b>	<b>44,182</b>	<b>6,351</b>	<b>84,044</b>	<b>673,600</b>
<b>Averages</b>	<b>21,059</b>	<b>32,843</b>	<b>4,418</b>	<b>635</b>	<b>8,404</b>	<b>67,360</b>

## AIRCRAFT FLIGHT HR. PERCENTAGES BY AIRCRAFT TYPE

**AIRCRAFT FLIGHT HOURS FOR FY2017**  
Percentages by A/C Type



**10 YEAR AVG. (FY08-FY17)**  
FLIGHT HOURS BY AIRCRAFT TYPE

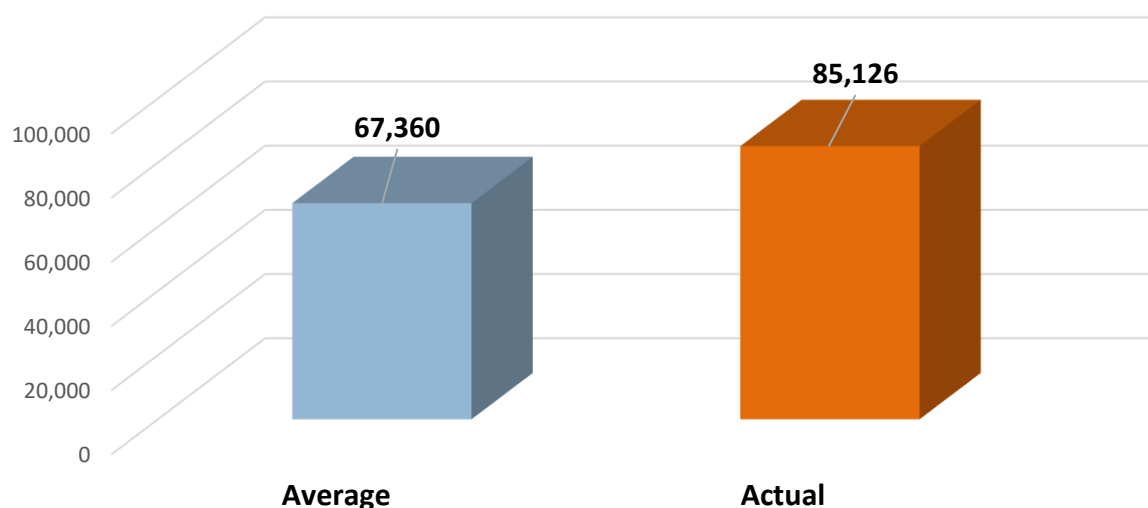


## FLIGHT HOUR – 10 YEAR AVERAGE VS ACTUAL BY AIRCRAFT TYPE

Year	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS O&O (Fleet)	Total
2017	23,217	45,285	7,625	393	8,606	85,126
10-YR Totals	210,594	328,429	44,182	6,351	84,044	673,600
10-YR Avg.	21,059	32,843	4,418	635	8,404	67,360



## 10-yr Average Vs Actual Hours Flown for FY17



### LAGGING INDICATORS: AIRCRAFT MISHAPS & FATALITIES

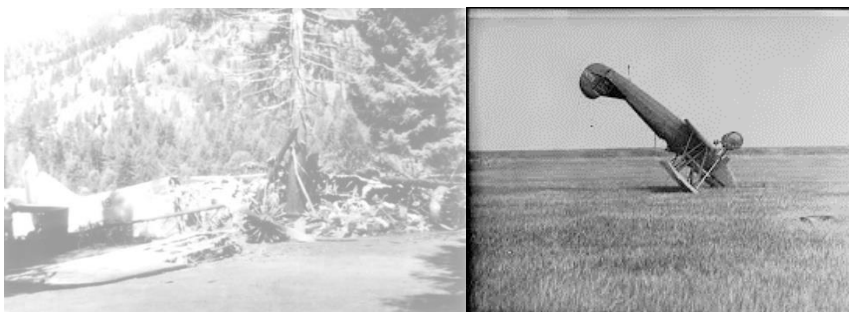
#### Forest Service Aviation Statistics for 2017:

Statistics	Rates
<ul style="list-style-type: none"> <li>Accidents – 1</li> <li>Incidents with Potential (IWP) – 3</li> <li>Fatalities – 0</li> </ul>	2017 Accident Rate: 1.17 (10-year avg. = 1.93) 2017 Fatality Rate: 0 (10 year avg. = 2.67)

### FY 2017 ACCIDENT STATISTICS- RATE CALCULATIONS

**Note: Formulas Used: Industry Standard “Per 100,000 Hours Flown”**

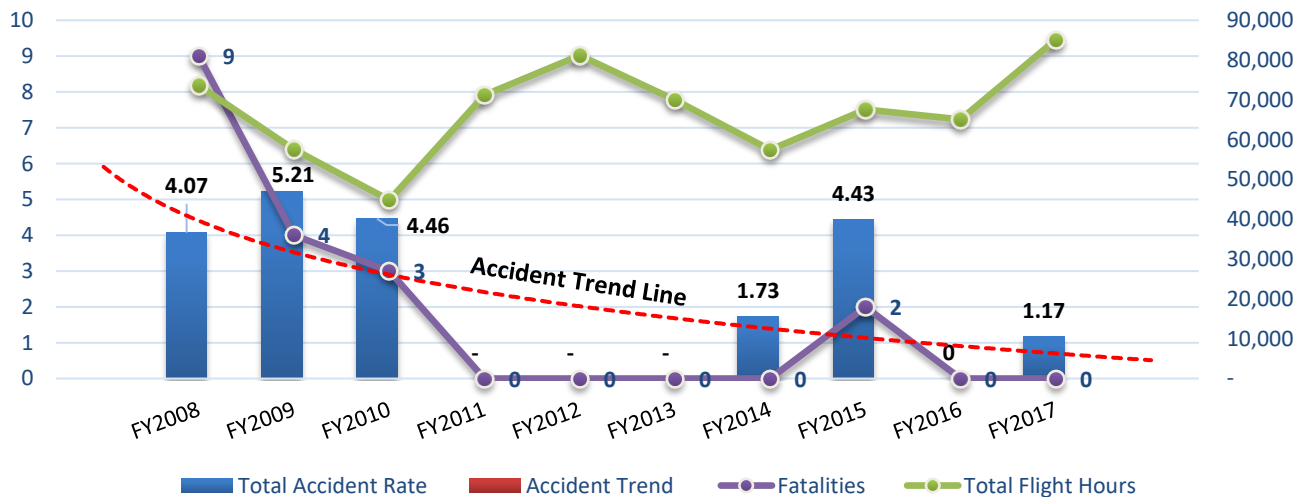
- Accident Rate = Number of accidents divided by the number of hours flown multiplied by 100,000.
- Fatal Accident Rate = Number of fatal accidents divided by the number of hours flown multiplied by 100,000.
- Fatality Rate = Number of fatalities divided by the number of hours flown multiplied by 100,000.



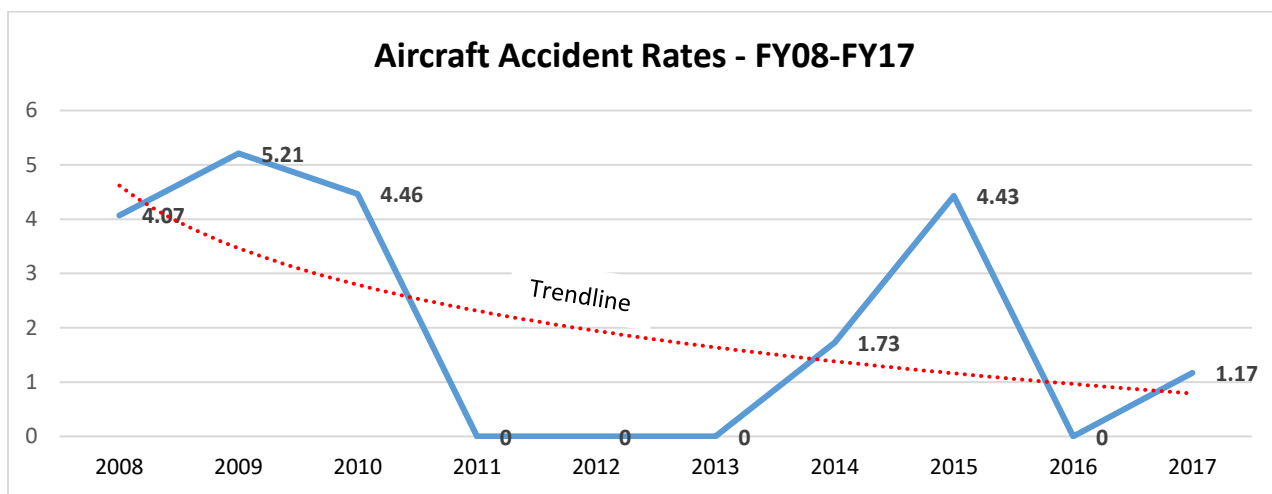
## 10 YEAR ACCIDENT STATISTICS - USFS AIRCRAFT

Aircraft Type	Hours	Number of Accidents	Accident Rate	Number of Fatalities	Fatality Rate
Fixed-Wing	23,217	0	0	0	0
Helicopter	45,285	0	0	0	0
Airtanker	7,625	0	0	0	0
Single Engine Airtanker (SEAT)	393	0	0	0	0
USFS Fleet -Owned and/or Operated (USFS O/O)	8,606	1	11.62	0	0
<b>Total</b>	<b>85,126</b>	<b>1</b>	<b>1.17</b>	<b>0</b>	<b>0</b>

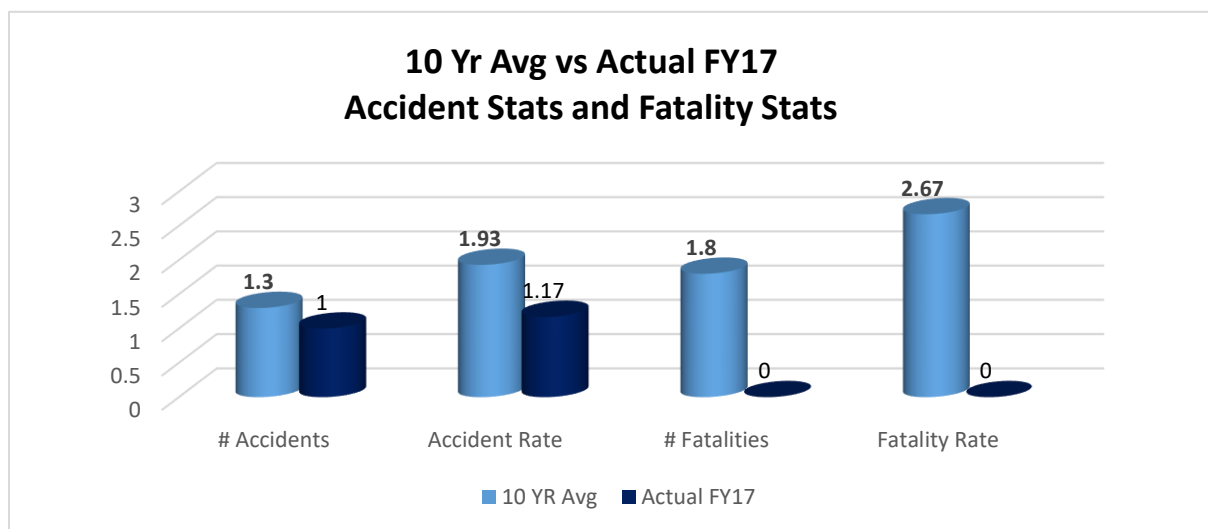
### 10-YR Accident Rate & Trend All Aircraft Types FY08-FY17



**Trending Data:** The accident trend line indicates the general pattern or direction of time series data (information in sequence over time). The trend line helps show a progression and helps link aviation safety efforts to the trends. The linear relationship for 10 years of accident statistics displays a significant downward trend (negative linear association) from 2008 to 2017, while flight hours remained relatively constant.



## 10 YEAR AVG VS ACTUAL – ACCIDENT AND FATALITY STATS

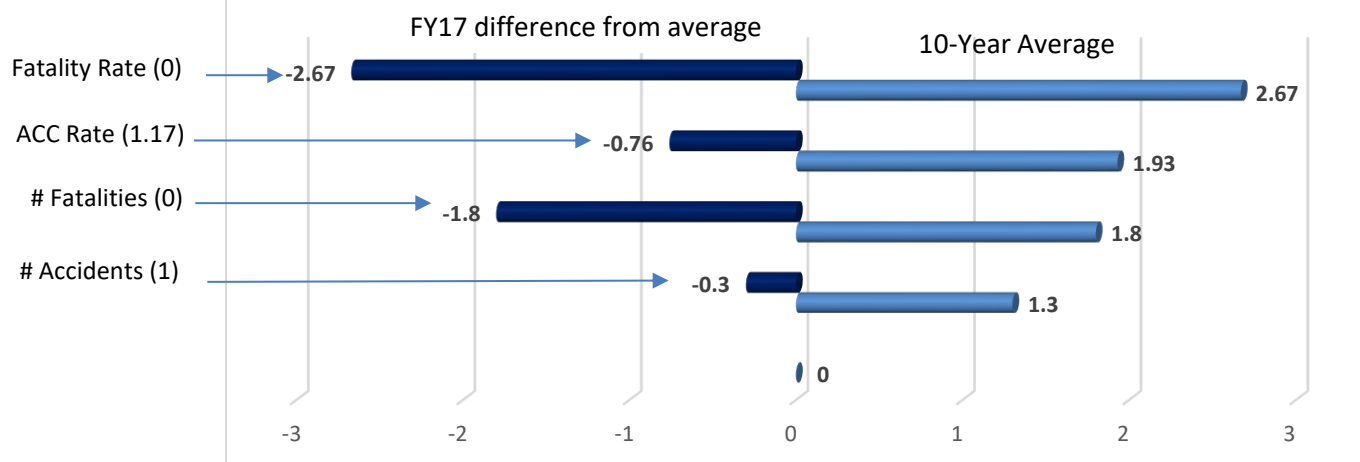


## Comparison of Average vs FY2017

	10 Year Average	FY2017	Comparison
<b>Hours flown</b>	67,360	85,126	+17,766
<b>Number of Accidents</b>	1.3	1	-0.3
<b>Number of Fatalities</b>	1.8	0	-1.8
<b>Accident Rate</b>	1.93	1.17	-0.76
<b>Fatality Rate</b>	2.67	0	-2.67

\*10 year averages for “rates” are calculated using the average values (ex: 10-yr. ACC rate =  $1.3 / 67,360 \times 100,000$  hrs = 1.93)

### Comparison to 10 Yr Average Accident Stats vs Fatality Stats



### ACCIDENT DATA BY AIRCRAFT CATEGORY: FY08 - FY17

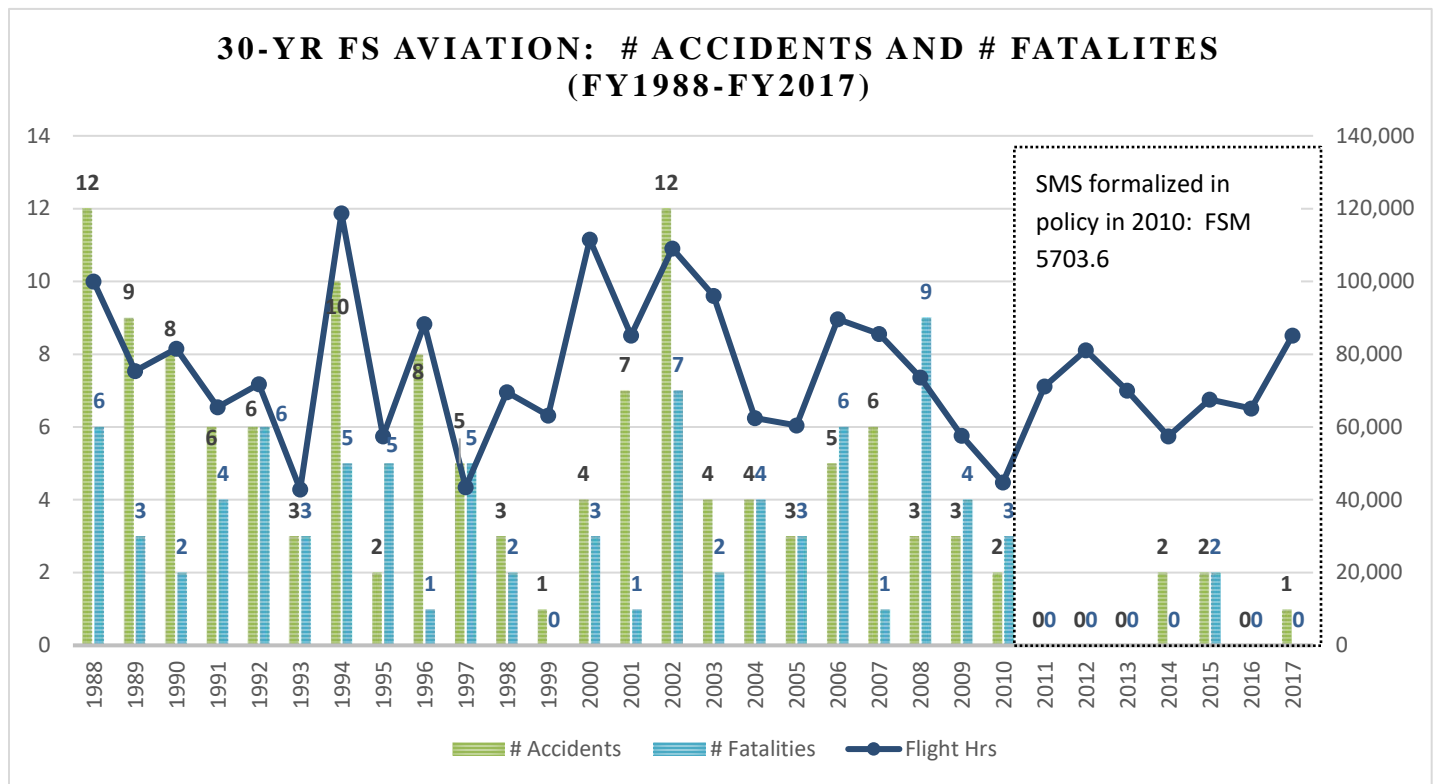
A/C Category	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS Fleet (O&O)	Total
# Accidents	4	5	3	0	1	13
# Fatal Accidents	1	4	1	0	0	6
# Fatalities	3	12	3	0	0	18

### ACCIDENT RATES BY AIRCRAFT TYPE: 10 YR. AVERAGE VS FY17

Year	# Accidents	Accident Rate	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS Fleet (O&O)
<b>FY17 Flight Hours</b>			23,217	45,285	7,625	393	8,606
<b>FY17</b>	1	1.17	0	0	0	0	1
<b>10 Yr. Avg.</b>	1.3	1.93	1.89	1.52	6.79	0	11.62



## 30 YEAR AIRCRAFT ACCIDENT & FATALITY TREND



**30 Year Aircraft Accident Trend Graph- discussion:** The information displayed in the graph above suggests a downward shift in the trend with regard to flight hours (exposure to risk) and the number of aircraft accidents experienced beginning in 2011. Prior to 2011, the number of flight hours generally correlated to the number of accidents. The agency made significant strides in aviation safety to increase focus on preventative efforts such as risk management, safety assurance and promotion as a result of some significant aircraft accidents (Iron 44 helicopter accident, and structural failures in airtankers). A Safety Management System approach was formalized in policy in 2010, followed by the first Risk Management workbook in 2011 to help identify hazards and manage associated risk levels with regard to FS missions.

As a result of one of the most significant accidents, the Iron 44 Accident in Weaverville, CA in 2008, and in response to NTSB recommendations, the FS added additional staffing to meet the workload in the airworthiness branch resulting in the hiring of additional personnel: 5 Airworthiness Inspectors, 2 Avionics Inspectors and 1 Aerospace Engineer. FS contract solicitations required vendors to show a company SMS, starting around 2010. Today, all vendors are required to show a company SMS as part of the contract bid. This is based on the philosophy that the operators/vendors have greater influence over the safety climate and safety behaviors of their flight and maintenance crews through the establishment of company SMS protocols, than FS policy requirements alone.

In 2016, [IASA 16-02](#) was published to highlight the pilot's authority to refuse risk. In addition, procedures for refusing risk are outlined in the Interagency Standards for Fire and Fire Aviation Operations as well as in the Incident Response Pocket Guide (IRPG).

The structured FS aviation policies provide the backbone of aviation SMS, but all levels of the aviation organization need to recognize the importance of operational safety being provided by the vendors and aircraft managers (helicopter and fixed-wing managers) in their actions and attitudes while actually performing work. The sharp decline in the number of accidents, while the number of flight hours remains steady can be attributed to the symbiotic safety effort between safety oversight employees and front line employees.

The decline in accidents and fatalities does not equate to “achieving safety” where we no longer need to pay attention. Instead, it is a measurable outcome that has a strong relationship to the diligent safety efforts at all levels of the agency and in the vendor community. It demonstrates that our collective focus on safety as a business practice is having a positive effect on outcomes, but it does require constant vigilance and effort to maintain.

## FOREST SERVICE AIRCRAFT ACCIDENT HISTORY- 1940 TO 2017

The initial use of aircraft in the Forest Service was to patrol for wildfires starting around 1919. The first recorded aircraft accident occurred on August 15, 1940 when the pilot of a Travel Air aircraft was fatally injured trying to assist fire fighters in the Bitterroot Mountains of Montana. The plane was caught in a down-draft over a rock-rimmed mountain lake and landed in two feet of water; a passenger in the aircraft survived.

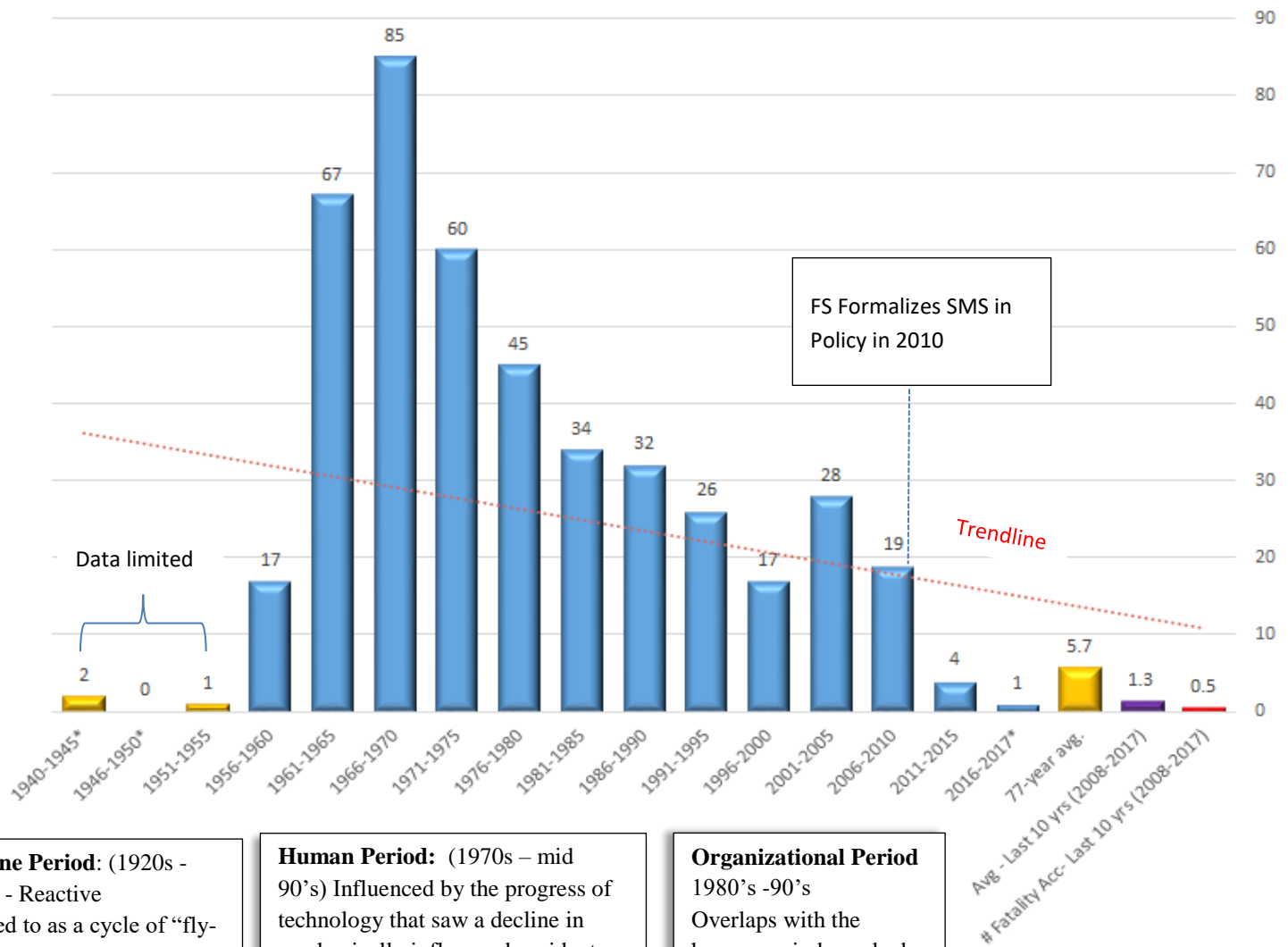


*Historical photo from the [National Smokejumper Association](#).*

The historical graph (shown on the next page) displays the number of recorded Forest Service related aircraft accidents that have occurred since 1940. Segments of the historical data are incomplete at this time, however, the display of available historical data is useful to see the accident trend over time as it relates to significant eras in aviation history and to Forest Service safety efforts.

SNAPSHOT OF SOME OF THE SIGNIFICANT EVENTS IN FS AVIATION HISTORY (Frey, 2007)			
<b>1919 – 1927</b> Airplanes used for detection	<b>1947</b> – FS purchases 17 aircraft	<b>2000-2003</b> FS Interest in SMS originates; RASMs attend SMS training (sponsored by the FAA)	
<b>1927-1929:</b> Airplanes used for cargo drops and pax transport	<b>1954</b> – Use of Retardant – developed into widespread use of aircraft on fires by the early 60's	<b>2008</b> – Iron 44 Helicopter Accident – 9 fatalities; resulted in increased emphasis on prevention efforts	
<b>1930</b> – 1st Water drop on a fire	<b>1964</b> – Infrared Flights	<b>2010</b> – SMS formalized in FS Policy; SMS Guide developed	
<b>1938</b> – FS purchases 1 <sup>st</sup> aircraft (Stinson)	<b>1971</b> - MAFFS Technology	<b>2011</b> – Aviation Risk Management Workbook Published	
<b>1940</b> – 1st smokejumper deployment	<b>1979</b> –USFS DC-3 Accident – 11 fatalities	<b>2010-2013</b> – Process to contract for NexGen Airtankers; SMS in contracts; improved airworthiness standards	
<b>1940</b> –1st USFS Aircraft Accident	<b>1981-2002</b> – Several airtanker accidents from CFIT and 4 significant accidents involving structural failures (wing separation)	<b>2012</b> – CRM 7 Skills Developed and adopted	
<b>1946</b> – 1st helicopter use			

## # Accidents - 5 year increments (1940-2017)



**Machine Period:** (1920s - 1960s) - Reactive  
Referred to as a cycle of “fly-crash- fix- fly”; marked the beginning of improvements to engines, airframes, system design and airworthiness.

**Human Period:** (1970s – mid 90’s) Influenced by the progress of technology that saw a decline in mechanically influenced accidents; emphasis shifted towards human factors. **Crew resource management** grew out of the 1977 Tenerife airport disaster; CRM was a global standard by 1990.

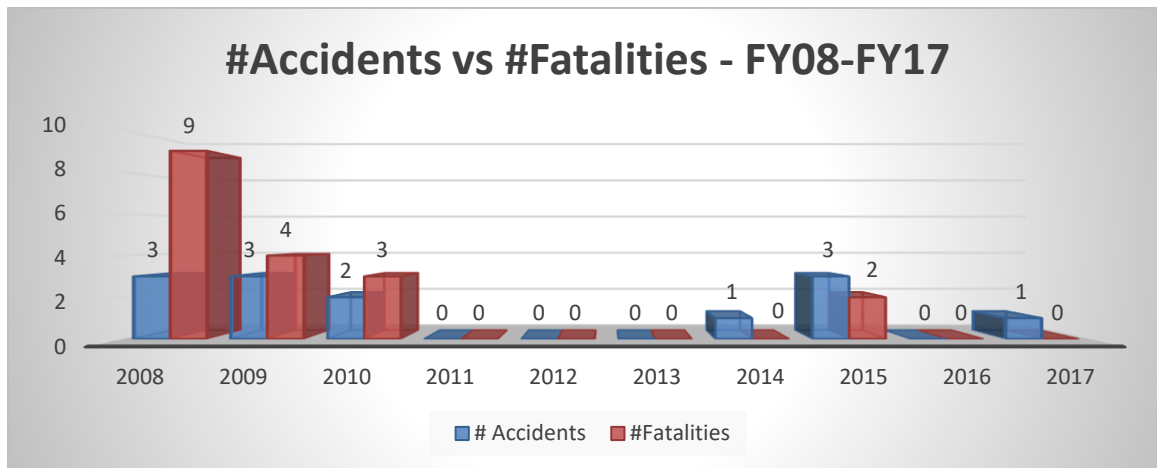
**Organizational Period**  
1980’s -90’s  
Overlaps with the human period; marked by the recognition that accidents have organizational influences.





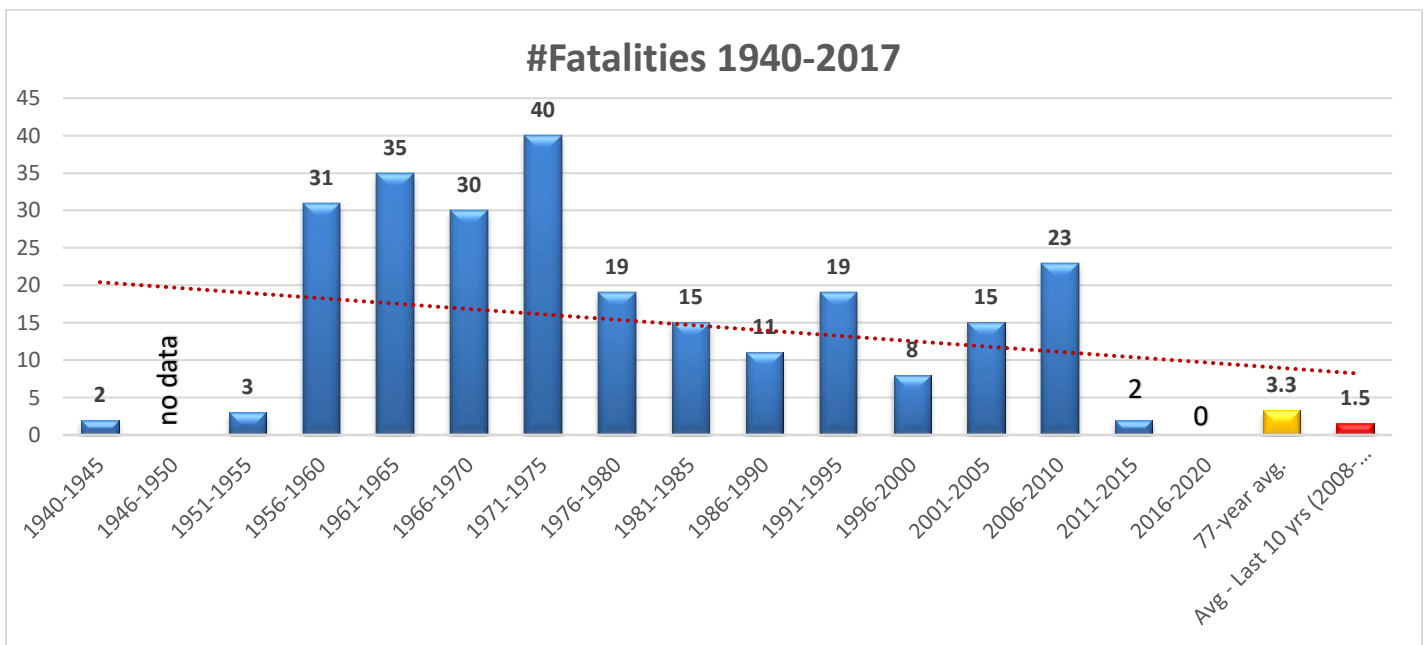
## FATAL ACCIDENT AND FATALITY RATES – FY 2017 AND 10-YEAR STATS

Year	# Fatal Accidents	Fatal Accident Rate	#Fatalities	Fatality Rate
2017	0	0	0	0
10 year average	0.6	0.89	1.8	2.67



## TOTAL NUMBER OF FATALITIES FOR ALL AIRCRAFT (5 YEAR INCREMENTS STARTING 1940)

The total number of accidents in 5-year increments shows general linear decline indicating a trend towards a decrease in the number of fatalities from aviation accidents.



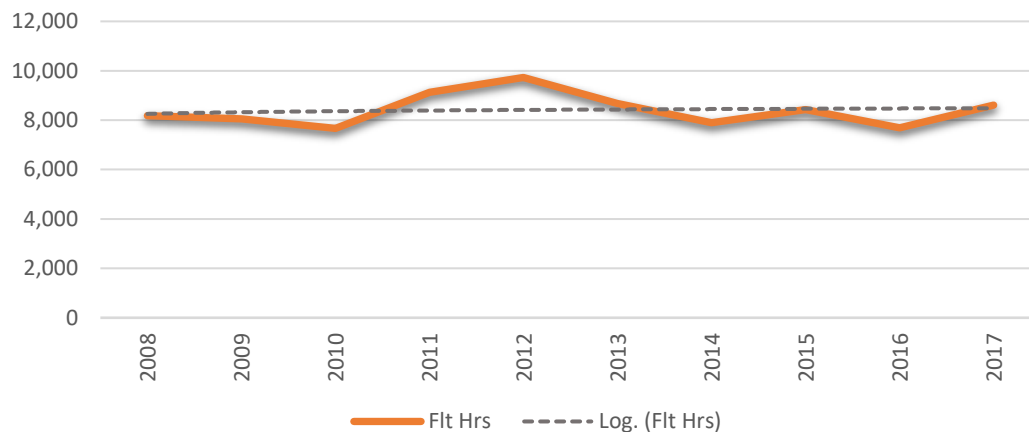
## AIRCRAFT ACCIDENT STATS & FLIGHT HOURS BY AIRCRAFT TYPE

### USFS OWNED AND/OR OPERATED (O&O OR “FLEET”) AIRCRAFT STATISTICS

This includes the 25 Forest Service owned fleet aircraft (20 fixed-wing, 3 helicopter and 2 airtankers) and 14 leased Forest Service-operated aerial supervision aircraft. The Forest Service owned and leased aircraft accounted for 8,606 flight hours in FY 2017; the 10 year average for flight hours is 8,404. Fleet aircraft accounted for 10% of the total flight hours; 10 year the average is 12%. There was one accident and one Incident With Potential involving Forest Service owned/operated aircraft, but there have been no fatal accidents for 21 years.

FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities	Fatality Rates
2017	8,606	1	11.62	0	0	0	0
10 Year Totals	84,044	1		0		0	
10 YR. Avg.	8,404	1	1.19	0	0	0	0

### USFS O&O Flight Hrs and Trend

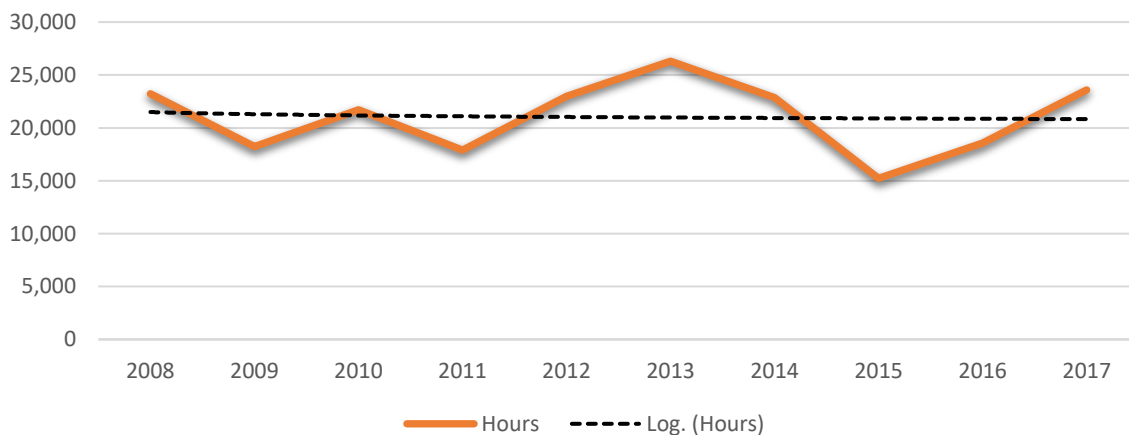


## FIXED-WING AIRCRAFT STATISTICS

This includes all contract fixed-wing aircraft, excluding all airtankers. These aircraft accounted for 27% of the total hours flown; the 10-year average is 31%. There were 23,217 hours flown, the 10-year average is 21,059.

FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities	Fatality Rates
2017	23,217	0	0	0	0	0	0
10 Year Totals	210,594	4		1		3	
10 YR Avg.	21,059	0.40	1.89	0.11	0.47	0.33	1.42

Fixed-Wing Flight Hrs and Trend

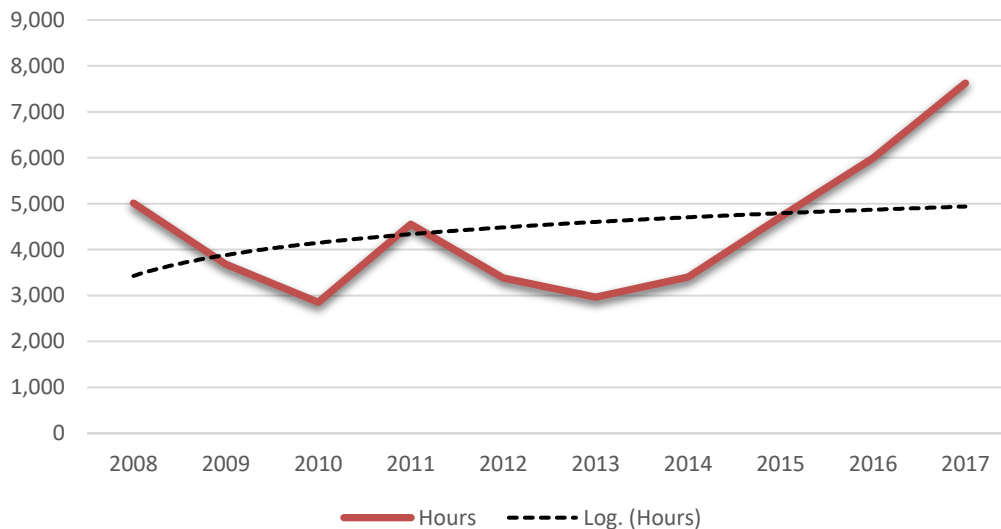


## AIRTANKER STATISTICS

This includes all contract multi-engine/jet large and very large airtankers and scoopers. Airtankers compiled 7,625 flight hours in FY17; the 10 year average is 4,418. Airtankers accounted for 9% of the total hours flown in FY17; the 10-year average is 7%.

FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities	Fatality Rates
2017	7,625	0	0	0	0	0	0
10 Year Totals	44,182	5		1		3	
10 YR Avg	4,418	0.5	11.31	0.1	2.26	0.3	6.79

### Airtanker Flight Hrs and Trend

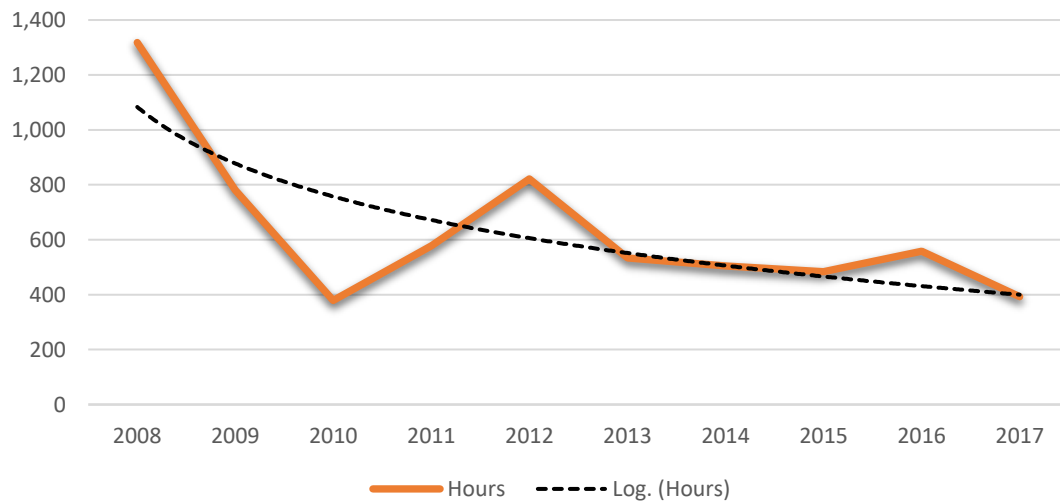


## SINGLE ENGINE AIRTANKER STATISTICS

This includes all contract Single Engine Airtankers (SEAT). The total flight hours for SEATs in FY17 was 393; the 10 year average is 635. Even with significantly less hours accumulated, SEATs still accounted for 1% of the flight hours in FY17; which is equal to the 10 year average of 1%. There have been no SEAT accidents in the 10 year statistical period. There has never been a fatal SEAT accident under USFS operational control.

FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities	Fatality Rates
2017	393	0	0	0	0	0	0
10 Year Totals	6351	0		0		0	
10 YR Avg	635	0	0	0	0	0	0

**SEAT Flight Hours and Trend**

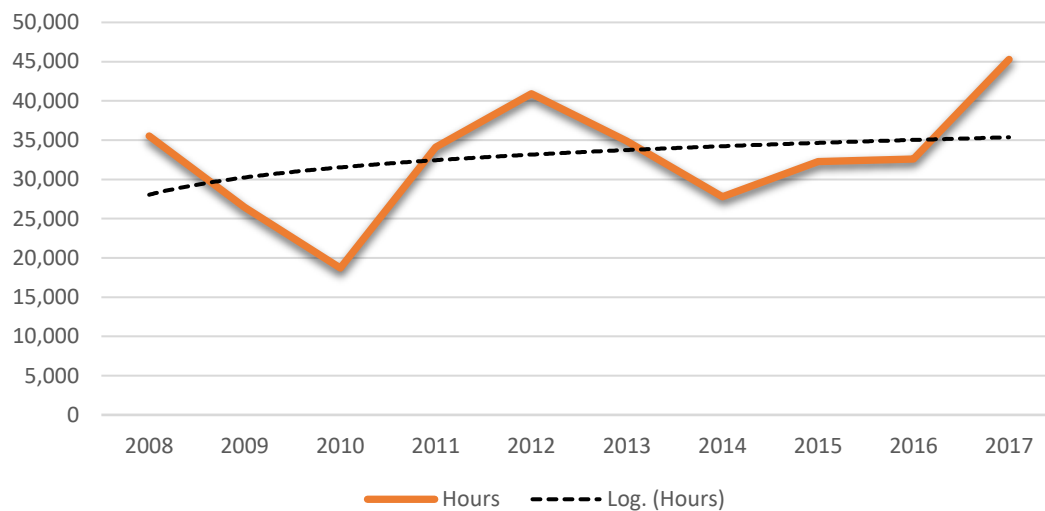


## HELICOPTER STATISTICS

This includes all contract helicopters. Helicopters accounted for 53% of the flight hours, the 10-year average is 49%. Total helicopter flight hours accumulated in FY17 was 45,285; the 10 year average is 32,843. There were no accidents this year.

Year	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities	Fatality Rates
2017	45,285	0	0	0	0	0	0
10 Year Totals	328,429	5		3		12	
10 YR Avg	32,843	0.5	1.52	0.3	0.91	1.2	3.65

### Helicopter Flight Hours and Trend



## MISHAP SUMMARY – FY17

Date	Aircraft Type	Mishap Category	Incident Description	A/C Procurement
7/17/17	Cessna TU206G	Accident	Porpoised Landing- improper landing flare in gusty winds	FS Fleet
6/13/17	Lockheed P2V & AT-802	IWP - NMAC	Landing at Airport- heavy traffic	Contract
6/6/17	BAe-146	IWP – near CFIT	Down air experience after drop	Contract
10/13/16	Shorts C23B+	IWP - landing	Hydraulics failure- nose gear collapse on landing rollout	FS Fleet

## GLOSSARY AND DEFINITIONS

### AIRCRAFT CATEGORY DEFINITIONS:

- USFS Owned and Operated (O&O) or “Fleet” includes a total of 39 aircraft; 25 fleet aircraft (20 fixed-wing, 2 airtankers and 3 helicopters) and 14 leased fixed-wing aircraft.
- Fixed-Wing Aircraft includes all contract fixed-wing, excluding all airtankers.
- Helicopters include all contract helicopters, including tanked helicopters.
- Airtankers include all contract multi-engine/jet, large and very large airtankers and scoopers.
- SEAT’s (Single Engine Airtankers: the USFS has only one SEAT on contract through DOI-OAS, however the hours are obtained from DOI-OAS for all SEAT’s utilized on USFS missions.

### MISHAP DEFINITIONS:

- Aircraft Accident: An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and the time all such persons have disembarked, and in which any person suffers death or serious injury or in which the aircraft receives substantial damage. During a jump sequence, a Forest Service smokejumper is considered to have safely disembarked the aircraft after detaching from the static line from the parachute deployment system and when the parachute canopy has successfully deployed. (Refer to [49 CFR Part 830, Subpart B—Initial Notification of Aircraft Accidents, Incidents, and Overdue Aircraft](#); 830.5 and 830.6 for information regarding reportable accidents)
- Aircraft Incident With Potential (IWP): An "in-flight incident" that narrowly misses being an accident by NTSB definition and circumstances may involve some aircraft damage, property damage, or minor injury to crew or passengers. Classification of Incidents with Potential is



determined by the US Forest Service, Branch Chief - Aviation Safety Management Systems.

**Operational Control** is defined as the exercise of authority over initiating, conducting, or terminating a flight ([14 CFR Part 1.1](#)). This includes direct management oversight, supervision and accountability for a specific task, mission or assignment.

- Forest Service fleet aircraft or aircraft on contract to the USFS that have a mishap while under operational control of another agency (i.e. BLM, NPS, FEPP, State, etc.) are not USFS reportable mishaps but that of the agency with operational control.
- Cooperator aircraft (fleet and contract) under operational control of the USFS that have a mishap are USFS reportable mishaps and are included in these statistics.
- Military aircraft remain under the operational control of the military even while supporting USFS operations.

## ACRONYMS

ACC: Short for “Accident”

ACE: Aviation Centered Education (Interagency)

AIR: Aviation Investigation Review (FS process)

AIRWARD: an interagency safety awareness campaign that recognizes individuals for significant contributions to mishap prevention

AMI: Aircraft Maintenance Inspector

BLM: Bureau of Land Management

CFIT: Controlled Flight Into Terrain

CRM: Crew Resource Management

DOI: Department of Interior

FAA: Federal Aviation Administration

FEPP: Federal Excess Personal Property

FMO: Fire Management Officer

FS: Forest Service

FSM: Forest Service Manual

FTA: Fire Traffic Area

FW: Fixed Wing

FY: Fiscal Year

HAI: Helicopter Association International

HIP: Helicopter Inspector Pilot

HMGB: Helicopter Manager

HOS: Helicopter Operations Specialist

IASA: Interagency Aviation Safety Alert

IAT: Interagency Aviation Training

IRPG: Incident Response Pocket Guide

IWP: Incident With Potential

LGAT- Large Airtanker

MAFFs: Modular Airborne Fire Fighting System

NexGen: Next Generation (Airtankers)

NMAC: Near Mid-Air Collision

NPS: National Park Service

NTSB: National Transportation Safety Board

OAS: Office of Aviation Services

PLDO: Plastic Sphere Dispenser Operator

QA: Quality Assurance

RASM: Regional Aviation Safety Manager

RXB1: Prescribed Fire Burn Boss, Type 1

SAFECOM: Aviation Safety Communique (SAFECOM) database – an interagency safety reporting website used to report aviation safety issues and concerns

SEAT: Single Engine Airtankers

SME: Subject Matter Experts

SMS: Safety Management System

TFR: Temporary Flight Restriction

UAS: Unmanned Aerial System --*is an all-encompassing term describing an entire operating system for the UAV: the ground control station with operator, communications equipment, support equipment etc.*

UAV: Unmanned Aerial Vehicle – associated with the UAS

USFS: United States Forest Service

WO: Washington Office (referring to the WO Fire and Aviation Staff)

## REFERENCES:

Frey, Melissa. 2007. The Humble Beginnings of Aircraft in the Forest Service, Fire Management Today Volume 67 • No. 2

